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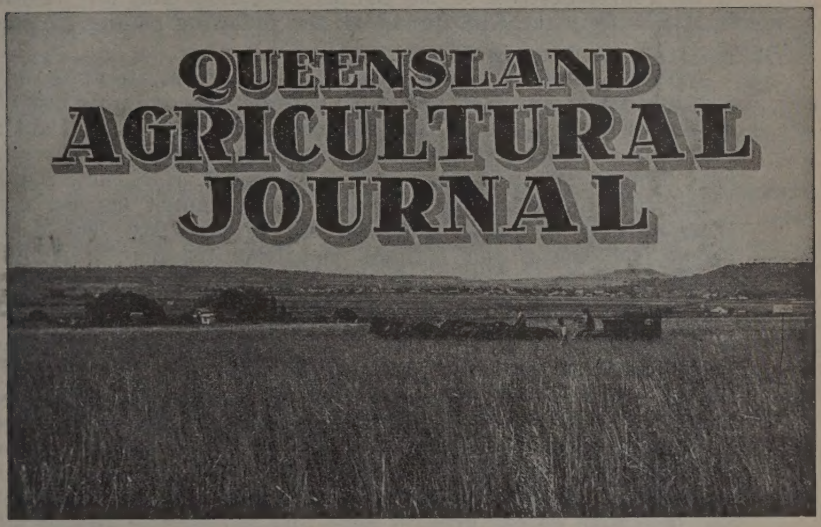


VOL. XLIII. 1 JUNE, 1935. PART 6

Event and Comment.

The King's Jubilee.

THE most noteworthy event of the month was the Commemoration of the King's Jubilee throughout the British Dominions. Describing the King as the father of his people, the Archbishop of Canterbury expressed the sentiments of the whole Empire when, at the historic gathering in St. Paul's Cathedral on 6th of May, he said:—

> The Empire has become a fellowship of self-governing peoples; yet their freedom has not lessened, but strengthened, their loyalty to the one Commonwealth. It is in one Throne that they find the symbol and bond of their unity.
>
> It may be that by mere force of cirucumstances or sentiment the Throne itself would have been accepted by the people of this realm, and the nations of the Empire, as the centre of their unity. What is certain is that the personality of the King has given to the Throne the power of personal attachment. He brought the Throne into the hearts of his subjects. They have discovered in the Sovereign a man whom they could understand, respect, and trust. They have seen in him a quiet dignity worthy of his high office, and with it an unaffected friendliness. They have seen his constant care for their welfare, and his unselfish devotion in their service.

The King's Message.

Responding to the messages of congratulations conveyed to him by radio by the representatives of the British Dominions and the Crown Colonies, His Majesty the King broadcast the following message to the Empire:—

At the close of this memorable day I must speak to my people everywhere. Yet, how can I express what is in my heart? As I passed this morning through such multitudes to St. Paul's Cathedral, and as I thought of all that these twenty-five years have brought to me and my country and my Empire, how could I fail to be most deeply moved? Words cannot express my thoughts and feelings, I can only say to you: My very dear people, the Queen and I thank you from the depths of our hearts for all the loyalty—and may I say, love—with which this day and always you have surrounded us. I dedicate myself to your service for the years which may still come to me.

I look back over the past with thankfulness to God. My people and I have come through great trials and difficulties together. They are not over. In the midst of this day's rejoicings I grieve to think that there are numbers of our people who are still without work. We owe to them, and not least to those who are suffering from any form of disablement, all the sympathy and help that we can give. I hope that during this Jubilee all who can will do their utmost to find them work and bring them hope.

It is to the young that our future belongs. I trust that through the fund inaugurated by my dear son, the Prince of Wales, to commemorate this year many of them throughout this country may be helped in body, mind, and character to become useful citizens.

To the children I would like to send a special message. Let me say this to each of them whom my words may reach:—

The King is speaking to you. I ask you to remember that in the days to come you will be citizens of a great Empire. As you grow always keep this thought before you, and, when the time comes, be ready and proud to give your country all your services.

I have been greatly moved by all the greetings which have come to me to-day from all my Dominions and Colonies, from India and from this, my home country. My heart goes out to all who may be listening to me now, wherever you may be—here at home, in town or village, or in some far off corner of the Empire, or it may be on the high seas.

Other anxieties may be in store, but I am persuaded that with God's help they may all be overcome if we meet them with confidence, courage, and unity. So I look forward to the future with faith and hope.

Let me end my words to you with those which Queen Victoria used after her Diamond Jubilee thirty-eight years ago. No words could more truly or simply express my deep feelings now: "From my heart I thank my beloved people. May God bless them."

The Farmers' S.O.S. Save Our Soil.

EROSION takes twenty times as much plant food from the soil as the hungriest crop. Between 1923 and 1933, 30,000,000 acres of agricultural land were destroyed by soil erosion, and ultimately abandoned in the United States. Within forty years, 90 per cent. of cultivable soil has been washed away in parts of British East Africa. In one region—Ukamba—the country is now a land of stark ridges of bare rock. The increasing native population obtains sustenance with the greatest difficulty. In drought years the natives have to be fed by the Government to keep them from starvation.

In 1920 the Union Government of South Africa appointed a Commission to inquire into the best means of avoiding drought losses, largely on the assumption that South Africa was gradually undergoing general dessication. After careful inquiry the Commission concluded that there was little evidence of change of climate, but that since the beginning of European settlement enormous tracts of country had been more or less denuded of the original vegetation, with the result that rivers and waterholes recorded by old travellers had dried up, disappeared, or only occasionally carried water. The consequent prospect was stated in this very alarming way:—"The simple unadorned truth," says the Commission's report, "is sufficiently terrifying without the assistance of rhetoric. The logical outcome of it all is the Great South African Desert, uninhabitable by man." The report goes on to say: "The quantity of rainfall shows little variation; its utility has certainly diminished, for the quantity absorbed by the soil is continuously decreasing, and for this man is responsible."

These impressive phenomena are, of course, not confined to America or Africa, and are common to every continent. Even Europe has its striking examples of the destruction of fertile territory, so essential to the maintenance of man.

The classic example of the Nile, with the joyful "Gyppo" reclining like the little lady in "Floradora" in the shade of the sheltering palm, watching the noble river working for him may, of course, be quoted; but there is, in fact, no comparison of the leisurely Nile with swifter flowing streams. The Nile's annual rise is extraordinarily gradual, and, to a great extent, the inundation of Lower Egypt is now well under control. There is no rush of silt or *débris* over the farming lands.

The causes of erosion are various, but the primary and most important cause is the wide-spread destruction of forests and other soil-binding or soil-retaining vegetation. In Queensland, every farmer on our coastal river catchment areas, as well as every producer in our back country, can see in his own neighbourhood what damage to both agricultural and grazing country unchecked soil erosion can do—damage hitherto quite unnoticed until, in many cases, the land has been robbed of its natural fertility by sheet erosion, or so gullied as to be useless, not only for cultivation but for grazing also. It is no exaggeration to say that in Australia almost every acre of sloping farming land, and much that is out of cultivation, in the higher rainfall zones is being affected by soil erosion.

In Australia generally, through the action of wind and water, depreciation and destruction of land has become definitely a serious national problem demanding immediate attention. Only in recent years has any notice been taken of it, and only then by those to whom the obvious facts have become apparent. So serious is the problem, and so disastrous are its effects, that the cry "Save our Soil" may well be regarded as agriculture's imperative "S.O.S."

The Control of Rats and Mice.

By ROBERT VEITCH, B.Sc.Agr., B.Sc.For., F.R.E.S., Chief Entomologist.

THE ravages of rats and mice in foodstuffs and their breeding and feeding habits are sufficiently well known to warrant dispensing with a discussion of these aspects of the rodent problem. Consideration of the pests may therefore be confined to the presentation of the main facts relative to their control. It is understood that these notes deal specially with the control of rats and mice in, or in the vicinity of, farm and other buildings.

Exclusion.

Firstly, emphasis must be laid on the desirability of rat-proofing certain classes of buildings by ensuring the elimination of all points at which the rats and mice can gain access. This involves a thorough examination of the buildings to locate such openings and their elimination by concrete, sheeting, wire gauze, or other suitable material. Such measures involving the rat-proofing of buildings are economically practicable in the case of large city produce and food warehouses and country storage depôts, and the saving resulting from the elimination or reduction of losses arising therein from attack by rats and mice justifies the expenditure involved. The rat-proofing of farm buildings is, however, quite a different proposition and cannot generally be accomplished at a cost that would be justifiable; hence, consideration in such cases must be given to the destruction of rats and mice by trapping, poisoning, or fumigation.

Trapping.

Trapping of both rats and mice is of considerable value in rodent control, experience indicating that the simple wooden spring trap produces just as satisfactory or even better results than much more elaborate and correspondingly costly devices. Mice are readily caught if the traps are placed close to the spots frequented by them. The bait may consist of bread, apples, raisins, cheese, or almost any other foodstuff. Rats are not so easily trapped, and success may not be achieved against them unless the traps are left unset, but baited, each day for a few days. They may then be once more rebaited, but this time they should be set, and, the rats' suspicions having thus been allayed, success may be achieved. Baits should, of course, be renewed each day, and in doing so and in handling rat traps generally the wearing of cotton gloves has been recommended.

Poisoning.

Should trapping fail to exercise a reasonable degree of control of the infestation, poisoning will have to be resorted to in order to clean up the rodent population. Experience indicates that the most satisfactory poisons to employ for the control of rats and mice are red squill and barium carbonate. The former is now much in favour, largely because it is the safest effective material to employ for such poisoning campaigns. The latter is also a favourite, chiefly because it is a somewhat inexpensive material, it is comparatively safe so far as human beings are concerned, and it is effective. It should, however, be handled with discretion, and precautions must be taken to ensure that it does not contaminate human or domestic animals' food.

Red squill will produce good results in a campaign for the elimination of rats and mice, but its successful use is dependent on attention

to certain details in the preparation and application of the baiting material. The first detail to which attention must be given is the provision of an adequate supply of bait to the rats and mice so that they may, if practicable, be eliminated by a single application of the material. The next point is that several types of bait should be laid in order to cater for the varying tastes of individual rats. A further important point is that as far as practicable no food other than the bait should be available to the rats and mice on the evening on which the bait is laid. Furthermore, the bait should be freshly prepared and applied in the late afternoon in small quantities about the size of a marble, particular attention being paid to the places where the rats and mice usually feed. Uneaten bait should be collected and destroyed.

Should some rats or mice survive the procedure just outlined, it will be necessary to repeat the treatment about three weeks later if a complete clean-up is desired. Baiting material is prepared according to the usual formulæ, except that the red squill is omitted. The bait is laid several times at two-day intervals, uneaten bait being collected and destroyed each morning. This procedure allays the suspicions of the rats and mice, and when these have been overcome red squill is once more included in the baiting mixture. It is well to emphasise the fact that although red squill is the safest poison to use for the control of rats and mice, it should not be handled carelessly. Most other animals, however, will either refuse to eat material containing red squill, or if they do they will soon vomit the bait.

Barium carbonate bait may also be employed in farm buildings with successful results. It is, however, poisonous to human beings and also to domestic animals, and in general preference should be given to red squill bait.

Fumigation.

Fumigation is frequently employed for the control of rats and mice, but it cannot be recommended for rodent destruction on the farm.

Bait Formulæ.

Red squill can be obtained either as a powder or as a liquid, such substances as fish, steak, bran, and oatmeal being employed in the preparation of the bait. A commonly employed bait is obtained by mixing 1 oz. of powdered red squill with sufficient water to produce a thin paste, which is added to, and well mixed with, 1 lb. of fresh, finely chopped-up meat. Another formula is one part of dry powdered red squill to ten parts by weight of oatmeal, minced meat, or minced fish, the ingredients being thoroughly mixed before distribution as bait. A third form of bait is obtained by cutting ½ lb. of bread into ½-in. cubes and mixing it with a pint of liquid red squill.

Barium carbonate is generally used in the form of a biscuit prepared by mixing one part by weight of barium carbonate with three parts of flour. These ingredients are mixed together, sufficient water being added to enable a stiff dough to be prepared. This dough is then rolled out to a thickness of ¼ in. and is cut up into pieces ½ in. in diameter. Finally, these small biscuits are dried in the sun or in an oven and are then ready for use.

The Pinhole Borer of North Queensland Cabinet Woods.

By J. HAROLD SMITH, M.Sc., N.D.A., Entomologist.

Continued from page 451, May Journal.

LIFE HISTORY.

DURING the summer months, and frequently at intervals in the winter if weather conditions are mild, adults of *C. grevilleæ* are abundantly distributed through the rain-forest; hence, when a tree is felled during the flight-active period of the day, numerous adults alight on the log or tree, doubtless attracted by the chemotropic stimulus liberated from cut or injured wood surfaces. At first males dominate the infestation and commence to initiate burrows on exposed wood surfaces; thus, presuming that the logs have been cut and lie in the original position of the bole, infestation may take place at the sawn ends, at the sides where bark has been stripped off or otherwise injured, and at the fork of the tree if fractures have exposed wood tissue. The bark is not normally penetrated. Most of the burrows on an exposed wood surface are excavated immediately, though minor supplementary infestation may occur for a week or thereabouts.

The burrow is sufficiently deep to conceal the male in a few hours. Once inside the wood, further excavation alternates with periodic backward movements by which débris is thrust through the outer opening until the burrow has been carried approximately half an inch into the wood. By this time females are common on the surface of the log and the sexes become associated in the one burrow in unusual circumstances. The female passes from burrow opening to burrow opening until she locates a suitable burrow tenanted by the male only. She waits there patiently until he makes one of his periodic visits to the mouth of the burrow with surplus débris, and then, by dint of caresses in which both forelimbs and head appendages are used, coaxes him from the burrow, often after repeated failures. The female then enters the empty burrow and is immediately followed by the male. The subsequent extension of the burrow system is now a function of the female, the accumulated débris being thrust outside the log by the male.

Mating has not been observed, but, as eggs may be laid while the burrow system is still a single undifferentiated tunnel, fertilization must be effected in the first instance outside the log. Eggs may, however, be laid by the parent female at various points in the burrow system over a period of some twelve months; hence it must be presumed that the initial mating ensures fecundity for that period or that further matings occur in the log as the burrow system is elaborated.

Eggs may occur singly or in groups wherever the burrow lies in a horizontal plane, but they are commonly found in special arms of the burrow system more or less isolated from the main thoroughfares. The reproductive capacity of the species must be considerable, for some hundreds of immature forms may be distributed through the one burrow system. Exact estimates are, however, impracticable, as the linkage of burrow systems initiated independently is apparently common when infestation is heavy.

Eggs hatch during the summer within one month, and larvæ subsequently collaborate with the female in extending the burrow system. Development requires twelve months, and by that time burrows have been carried well into the heartwood of the log. The whole of the wood tissue is thus exploited by a network of burrows in a plane at right angles to the length of the log. Eggs and larvæ of all ages are then distributed through the burrow system.

Prior to pupation, mature larvæ congregate in branch burrows and excavate pupal chambers, which are grouped in typical Platypodid fashion. The chambers in any one group lie on both sides of the burrow in the one plane. The chambers are thus parallel to the length of the log and follow the grain of the wood. Chambers on opposite sides of the burrow usually alternate—a phenomenon which may be due to contemporary chamber excavation by the larvæ. The chamber dimensions correspond with the size of the enclosed insect, being normally 4 mm. in length, though there is some variation with the sex of the occupant, female pupal chambers being rather longer than those of the smaller male.

When transformation within the pupal chamber is complete, the adults break through the sealed mouth and re-enter the main channels of the burrow system. They ultimately escape from the log either through the outer surface or fissures leading to the outside. In any case, the insects do not use the original opening made by the parents and blocked by the body of the male, but construct independent exits. A number of these may be seen in any advanced burrow system, and it appears that several emerging adults share the one exit burrow.

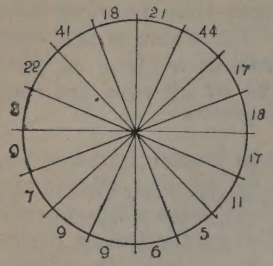
In all probability, only a single generation occurs in the log. The offspring of the original parents require some two years for the completion of development, allowing egg-laying for twelve months and a further twelve months for larval growth. If *C. grevilleæ* remains in a log for more than two years, the phenomenon can best be explained by delayed initial infestation rather than presumed multiple generations in the log.

Behaviour on the Log.

Though adult insects wander at random over the surface of the log, the subsequent disposition of the burrows is not uniform, and suggests preferences of some significance to the insect. In one observational log concentric rings of the bark, 1 ft. across, were removed to expose the underlying sapwood. When infestation was complete, the burrow mouths were counted and their location noted. A typical example is portrayed diagrammatically (Plate 183, figs. 1 and 2), and indicates quite clearly that the maximum infestation occurs on the latero-dorsal surface, and diminishes towards both the top and bottom of the log.

In experimental material, split and sawn surfaces in different parts of the log were exposed to infestation and log sections were placed in many different positions for observational purposes. The incidence of infestation on these sheds some light on the behaviour of the species, and significant points are—

(*a*) Where a bark edge impinges on sapwood, the burrows tend to be concentrated in the 2 or 3 in. of sapwood adjoining the bark. Their distribution is illustrated diagrammatically (Plate 183, figs. 3 and 4).



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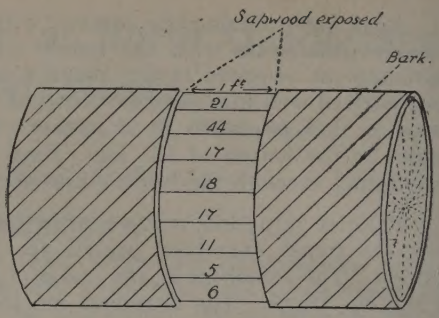

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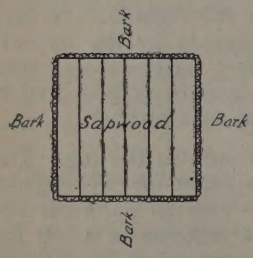

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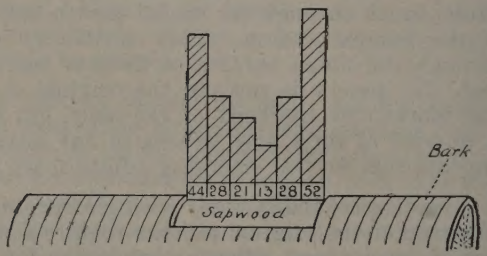

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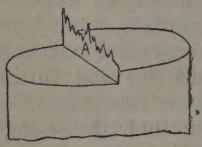

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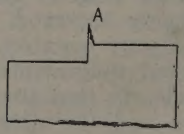

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I.W. Helmsing (after Smith) 1935.

PLATE 183.

PINHOLE BORER (*Crossotarsus grevilleæ* Lea).

Fig. 1—Diagram showing infestation round log. Each sector 9 in. by 12 in. Fig. 2—Diagram showing position of exposed sapwood and varying intensity of infestation on side of log. Fig. 3—Diagram of 1 square foot of exposed sapwood on upper side of log. Burrow concentration at bark-sapwood edges thereon shown in Fig. 4. Fig. 4—Diagram of burrow density in 2-in. strips showing concentration of infestation at bark-sapwood edges. Fig. 5—Splintwood on tree stump (semi-lateral view). Fig. 6—Splintwood on tree stump (lateral view).

(*b*) During felling, two horizontal cuts are made with a crosscut saw on opposite sides of the tree. The tree frequently collapses before these independent cuts meet, and between the two a certain amount of fracturing takes place. Splintwood at the fracture normally suffers heavier infestation than the rest of the exposed surface of the tree stump. The position of such splintwood is indicated in Plate 183, figs. 5 and 6.

(*c*) Infestation on a horizontal surface is usually slight; thus, the upper surface of the tree stump escapes with comparatively light attacks, while barked surfaces at its side are burrowed into freely.

If *C. grevilleæ* were unaffected by outside influences, a randomised infestation of susceptible surfaces would be expected, but these examples suggest that some factor or factors induce variable attacks. The pedal disability of the insect apparently has some importance in this connection. Both sexes find it difficult to retain a foothold on wood surfaces facing the ground; hence they readily fall from the log should their movements be obstructed by burrow débris. Burrow initiation presupposes a firm grip of the log surface—a condition better satisfied on the upper than the lower side of the log. Pedal disabilities would thus stimulate burrow initiation on the upper surfaces of the log or stump. Were it otherwise, the under surface of the log would be the obvious place for the adults to initiate burrows, as that region is less subject to extreme solar influences than other parts of the log.

A second factor of some importance is undoubtedly thermal. On a flat exposed surface solar influences are evenly distributed, while on the rounded surface of a log temperatures reach their maximum at the top, diminishing along the sides to a minimum below. Ordinarily the inception of new burrows in the open is restricted to a few hours before and after noon. When log-surface temperatures are very high, the adults show a great deal of distress and are almost incapable of initiating burrows. It seems clear, then, that extremes of heat on the upper surface of a log will tend to force would-be burrowing insects to the sides. An example is afforded by the stumps of trees felled under conditions suitable for infestation. Few burrows are then initiated in the upper surface, while susceptible wood elsewhere suffers severely. The effective burrowing period on any log surface, if controlled solely by temperature, would thus be least on the top of the log and greatest below.

The actual concentration of burrows on the latero-dorsal surface thus seems to be a compromise between the two main limiting influences —pedal disability and surface log temperature, the former inhibiting burrow initiation below, the latter above, the log. Pedal disability is, however, a permanent influence and contrasts with thermal limitations, which operate only during the hotter parts of the day.

From the examples cited it seems that the distribution of burrows on exposed sapwood represents an attempt to reconcile various influences tending to inhibit burrow formation. The concentration of burrows on the latero-dorsal surface is apparent only when the bark has been removed from the tree or the log either completely or in strips. Should the insect population be considerable and the area of exposed sapwood limited, heavy infestation is practicable regardless of its position. The distribution of burrows from log to log may thus vary with the incidence of the pest and the position and amount of exposed sapwood.

The urge to burrow is so evident in the male that, given suitable wood surfaces, excavation begins immediately. The preference for perpendicularly placed splintwood is probably due to the partial elimination of disturbing solar influences which normally operate on horizontally exposed surfaces, together with the added chemotropic attraction associated with ruptured wood tissue.

The aggregation of burrow openings on sapwood surfaces near a bark edge is rather striking, though the stimulus causing it is somewhat conjectural. Possibly the greater incidence of infestation is due to the increased chemotropic attraction associated with centres of sap exudation. At a bark edge the main conducting tissue of the plant is severed, and a heavy fluid exudate is discharged in limited quantities from the injury. If, as seems probable, the adults respond readily to chemotropic influences, the concentration of burrows in the neighbourhood of the discharge would be expected to conform with the example illustrated in Plate 183, figs. 3 and 4.

The Burrow System.

The burrow system of *C. grevilleæ* has the same essential pattern in all logs or tree residues examined. Should the insect enter exposed sapwood on the side of the log, the burrow is carried directly into the wood for 1 or 2 in., and then tends to become more intricate. Some main leaders pass straight into the heartwood, while subsidiary branches cut across themselves and link the main leaders until the whole cross-section of the log has been exploited. The burrow system normally lies in a plane which cuts across the grain of the wood; hence a cross cut often discloses its main features. Plate 184, figs. 1 and 2, displays the essential features of two burrow systems examined. Long, sweeping tunnels pass straight into the centre of the log, and in the heartwood subsidiary linkage yields quite a complex burrow system. Complexity is not, however, confined to the heartwood, for the distinction between sap and heart woods—so important to many timber-borers—has no influence on the habits of *C. grevilleæ*—at least, in the rain-forest species studied. At various depths subsidiary tunnels of no considerable length end blindly in the wood and invariably lead to series of grouped pupal chambers.

The final burrow system as illustrated in Plate 184, fig. 2, is the joint work of original infesting adults and their progeny, though the precise contribution of each is uncertain. The parent insects initiate the burrow and carry it down to a depth at which the first batch of eggs are laid. From time to time the female excavates branches in the inner recesses of the heartwood, where further eggs are laid, but the male plays a more or less passive role after mating is completed. It is inferred that the immature forms are chiefly responsible for burrow extension, though the tunnels excavated by the females for the reception of eggs may play a part in forming the main pattern. In the specimen under discussion there are three, and possibly five, burrows leading to the periphery, and it is a moot point whether all these represent points of adult ingress or egress. As some of the main leaders link well within the heartwood, they probably represent inward paths and indicate a linkage of burrow systems, the whole housing the progeny of several original parents. Egress through fissures has been demonstrated in commercial logs, but cannot be the only method of escape, for fissures may be absent from some timbers—*e.g.*, kauri pine, in which development is completed. Newly emerged adults may escape from any surface, and possibly some of the burrows leading to the outside in this specimen

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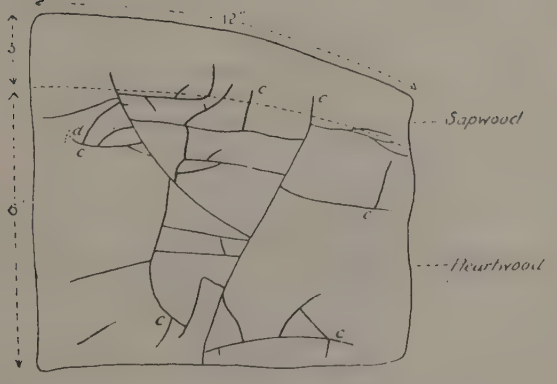

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I.W. Helmsing (del. Kr Smith)
1935

PLATE 184.

PINHOLE BORER (*Crossotarsus grevilleæ* Lea).

Figs. 1 and 2—Burrow systems in walnut bean: (*a*) Entrance burrow; (*b*) sapwood elaboration; (*c*) heartwood elaboration; (*d*) blind tunnels communicating with pupal chambers; (*e*) exit burrows.

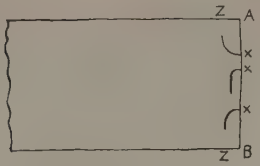
have been excavated by escaping forms. The importance of either mode of escape will largely depend on the character of the wood attacked.

Under natural conditions in the rain-forest, limbs are often attacked in fractures induced by the fall of the tree. Wood thus exposed is infested, though the limbs may not be more than 12 in. in diameter. Under such conditions burrow extension proceeds normally until halted by the bark on the opposite side of the limb, the larvæ often not having reached maturity. Deviations from the normal burrowing habit allow the completion of development, and the adults subsequently escape through the bark. The burrow system peculiar to limb infestation differs in some respects from that in logs cut from the bole of a tree. In these the burrow system is normally confined to a single plane which cuts directly across the grain of the wood. Sawn sections thus expose a large part of the system, while split sections—which naturally follow the grain of the wood—cut across a number of independent systems, each of which appears as a linear series of burrow intersections (Plate 185, fig. 3). Linkage between these has not been seen in commercial logs. In limb infestation, however, burrows along the grain may link separate cross-grain burrow systems or parts of the one system. The connecting burrows may be some inches in length and located at various depths in the wood. A high insect population in a limited wood volume is apparently the cause of the abnormality, for similar connecting links occur when bark infestation is attempted by this species without successful penetration of the sapwood. Here reproduction occurs within the narrow limits of the bark, and some relief would obviously be gained by burrow deviations along the length of the log.

Limb infestation produces a further aberration. When bark is peeled from infested limbs some considerable time after burrow initiation, it is not uncommon to find a network of tunnels on the sapwood surface (Plate 185, fig. 4). These burrows house larvæ in all stages, and occur when further development is hampered by the limited cross-section of the limb. These sapwood surface markings resemble those frequently constructed by *Xyleborus hirsutus* Lea, and usually occur when a large insect population is working in a limited space. Similar phenomena have been noted for other Platypodids.

Lateral infestation is by no means the only method of *grevillea* penetration, for end infestation of the log through the sawn surface, particularly the sapwood, is also common. In such cases the burrow follows the grain for a short distance, but ultimately, and characteristically within 1 or 2 in., swings round into the trans-grain direction, when burrow elaboration proceeds as usual (Plate 185, fig. 1). The actual angle at which entry is made does not alter the general position. Adults entering the stump of a tree at the horizontal sawn surface ultimately construct a burrow system in the horizontal plane, while those entering the ends of a cut log finally work in a vertical plane. Burrows parallel to the grain of the wood are thus an exceptional device used in certain circumstances to facilitate the exploitation of the available wood.

The lateral spread of the burrow system from a limited point of entry was clearly demonstrated in some experimental material. Plate 185, fig. 2, illustrates a diagrammatic cross-section through a limb in which the sector AB was the only point of entry. The shaded area indicates the wood tissue exploited by the insects after ten months. The extension of the burrow system is seen to proceed in all directions, though the rapidity of exploitation is greatest in the radial line. Ultimately the whole of the wood may be riddled in the one particular plane.



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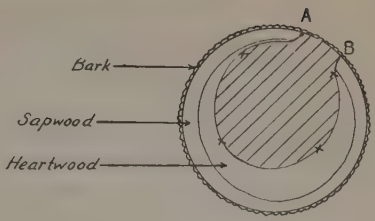

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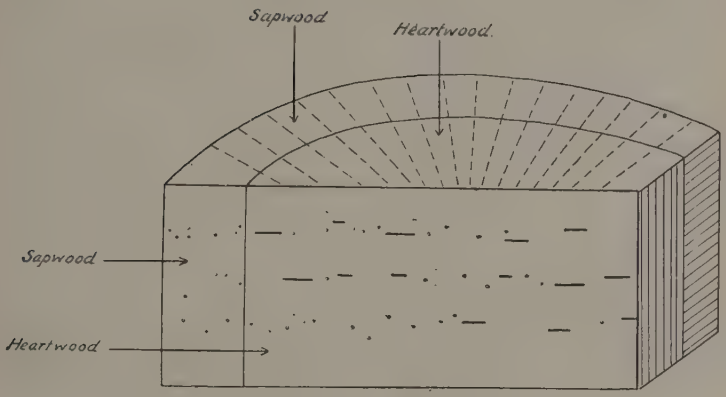

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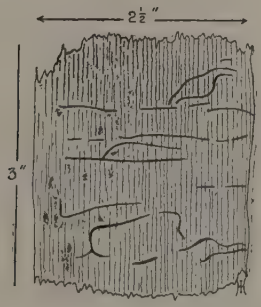

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I.W. Helmsing (after Smith)
1935.

PLATE 185.

PINHOLE BORER (*Crossotarsus grevilleæ* Lea).

Fig. 1—Diagram of burrow formation following end infestation of log. Infestation at xxx on end surface AB. Burrows subsequently excavated in plane ZZ at right angles to length of log. Fig. 2—Diagram of lateral spread of burrow system. Entry at sector AB only. Limits of burrow system xxxx. Fig. 3—Section of walnut bean intersecting three burrow systems. Note that each burrow system cuts across the grain of the wood. Fig. 4—Walnut bean showing sapwood surface burrows beneath the bark.

Feeding Habits.

The tunnels of pinhole borers are usually discoloured through the action of fungi which subsist on the walls. When burrows are vacated, the tunnels may become blocked with a compact hyphal mass, which is often sufficiently cohesive to remain intact when the log or log section is broken up for examination. Prior to this stage the fruiting bodies may be seen fringing the walls. A number of these fungi have been cultured on laboratory media and examined by R. B. Morwood, M.Sc., Assistant Plant Pathologist, who has determined the two chief as examples of the genera Monilia and Pennicillium. Fungi in the genus Monilia are usually regarded as imperfect stages of the higher Ascomycetes.

Pinhole borers have been frequently designated "ambrosia beetles" —a name given because some, if not all, feed on fungi cultivated on the walls of the burrow system. More recently it has been suggested that the larvæ are essentially sap-feeding in habit, subsisting on wood exudates rather than fungal growth. Some inferential data indicate that both methods of feeding are normal to *C. grevilleæ*.

After burrow initiation, débris is thrust from the burrow mouth for some weeks until egg-laying begins; thus, presuming that sustenance at reasonably short intervals is necessary for the adults, their requirements must be met, in the early stages of burrow excavation at least, by sap exudates from the wood tissues broken down.

Within a short period of burrow excavation the walls show some discolouration, which, in part at least, is attributable to the establishment of fungi. Were the growth of these unchecked, the mycelial development would soon block the burrows, and the insects must crop down the fungi if free movement is to continue. Under some circumstances, both larvæ and adults live in a burrow system which is not being extended; thus, after heavy infestation in injured bark, a numerous insect population may subsist in a burrow system which cannot for some months be carried through to the sapwood. Growth and development of the insect are normal, and it may be presumed that the fungal growth on the burrow walls is a satisfactory food during the period.

It appears, therefore, that both fungal and sap-feeding habits can be correctly ascribed to the insect. Possibly fungi are the normal food of *C. grevilleæ*, while sap exudates may serve as an auxiliary food when mycelial growth is not available, or in conjunction with it when burrow extension is in progress.

Duration of Tenancy of a Log.

Under natural conditions, the greatest injury is caused by insects which gain access to the log or felled tree at exposed sapwood surfaces. In the newly cut and handled log most of the sapwood is protected by bark, but after subjection to weathering the bark may fracture, and *C. grevilleæ* penetrates the freshly exposed wood surfaces. This process of bark-loosening may cover a considerable period, and permits the infestation of any one log for some months. The pinhole borer population of a log may thus include the progeny of adults which have gained access to the wood at any time between the date of felling and its removal from the rain-forest environment. Fresh infestation has been observed in the rain-forest on logs felled nine months previously, and the end effect is simply the co-existence of burrow systems initiated at

different times. Under such conditions, it is sometimes difficult to decide whether the known Crossotarsan tenancy of a log is merely the life-cycle of the first invaders only or this plus the difference between the dates of first and last new infestation. Ultimately, however, the whole of the heartwood may be riddled, and this phenomenon is common in commercial logs of, say, 12 ft. girth after a period of eighteen to twenty-four months. Even then immature forms may be found which require some months for the completion of their development. It follows, therefore, that *C. grevilleæ* may be found in logs for three years after felling, the period depending entirely on the suitability of the wood for insect development. Specimens of freshly-cut heartwood from six or seven-year-old logs exercise some attraction for the insect and permit fresh infestation, but under ordinary conditions superficial drying of the sapwood prevents the attraction latent in the core of the log being felt outside. The exposure of the inner wood by either saw or axe merely opens the way for fresh infestation.

Under normal conditions, the Crossotarsan tenancy of the log will thus depend entirely on the amount of wood volume and its stimulus to fresh infestation, the latter being controlled by the rapidity of superficial drying and the presence or absence of freshly exposed surfaces. In some timbers the insect will remain in possession until the whole of the wood is exploited, while in others changes in the wood itself, such as occur in softer species, will compulsorily end the tenancy in a relatively short time.

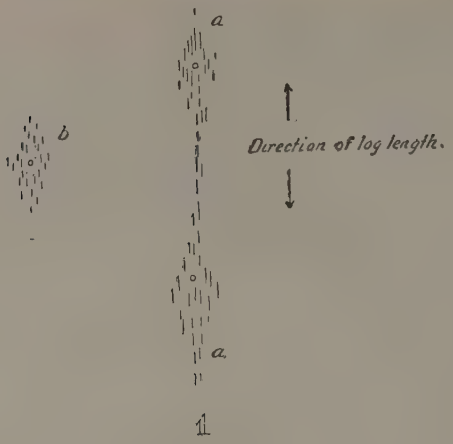
Wound Injuries in the Living Tree.

Wound injuries in which the bark is stripped from the sapwood of the tree are common in the rain-forest, and insects frequently attack the damaged tissues. Sometimes the dimensions of the burrows correspond with those of *C. grevilleæ*.

In 1933 a strip of bark was removed from a standing tree on the edge of a rain-forest clearing during the summer months. Males of *C. grevilleæ* were immediately attracted to the exposed sapwood and initiated burrows, though the rate of infestation was less than in adjacent susceptible log material. Mating subsequently took place and immature forms were recovered from the burrows, the development of the burrow being similar to that commonly found in ordinary felled material.

By analogy with the behaviour of *C. grevilleæ* in logs, the burrow system would be carried further into the wood and the adult progeny would subsequently emerge through the bark. Pupal chambers have not, however, been found within the infested wound tissue, and development may not be completed. Possibly successful reproduction in injured trees depends on the vitality of the plant, for a heavy flow of sap may be inimical to free development of the insect.

A special type of injury is to be found when a tree strikes another in the path of its fall. The bark is then stripped from a tree as before, but at one particular point the sapwood tissue is crushed by the violent impact which takes place. The infestation per unit area at these points is always much greater than at other parts of the exposed sapwood, regardless of other influencing factors. Should the infestation be low, *C. grevilleæ* may attack areas of crushed wood in either the standing tree or the cut log to the exclusion of other susceptible parts. Apparently the chemotropic stimulus associated with infestation is intensified where the sapwood has been crushed.



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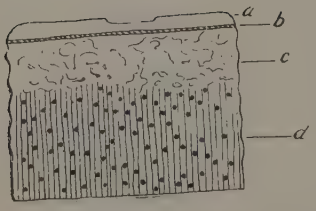

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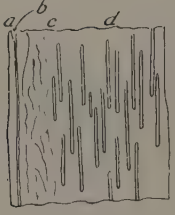

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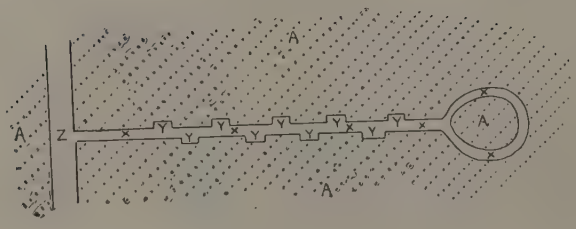

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I.W. Helmsing (after Smith)
1935.

PLATE 186.

PINHOLE BORER (*Crossotarsus grevilleæ* Lea).

Fig. 1—Diagram showing discoloured wood tissues adjacent to burrows in living tree: (*a*) Burrows in alignment; (*b*) single burrow. Fig. 2—Diagram showing section through bark of walnut bean: (*a*) Surface corky layer; (*b*) hard whitish layer; (*c*) compacted tissues in process of dissolution; (*d*) matrix of bark showing sclerophyllous columns. Fig. 3—Diagram showing longitudinal section through bark of walnut bean: Details as in Fig. 2. Fig. 4—Diagram of suggested canopy ramp: (A) Rain forest; (X) track under canopy, with turning facilities for teams at end; (Y) dumps for logs; (Z) main teamster track.

Wound injuries of a similar type have been noted in the rose butternut, *B. involucigera*, but these have been caused by the comparatively rare borer *Platypus* sp.

Infestation of the felled log usually induces some discolouration of the wood immediately surrounding the burrow path, the discolouration spreading equally in all directions through the sound wood. In burrow-riddled sapwood of the living tree the discolouration causes a diamond-shaped blemish, the long axis of which is parallel to the bole of the tree. It would thus appear that the fungus or associated organisms responsible for the discolouration are distributed for some distance along the natural lines of fluid conduction in the ordinary transport medium. Should burrows approximate, the fusion of discoloured areas may result, and an example is diagrammatically shown in Plate 186, fig. 1. The discolouration varies from species to species in both extent and colour, rose butternut being a striking example in which the discolouration is a bright yellow, the blemishes covering an area of some square inches.

Significance of Log Faults.

Most commercial logs cut in North Queensland show defects. These flaws are of some moment in the insect economy as they may permit the entrance of adults and the exit of their progeny after the completion of development. The most important flaws may be grouped as follows:—

(*a*) Radial cracks through the centre of the log which may, following fungal breakdown with or without white ant invasion, develop into pipes of some kind or other. Except in so far as these represent the loss of a given volume of wood, they do not present complications in the mill, for trimming is a simple matter when the log is being sawn into flitches. In view of their frequent occurrence in the North, the cause must be common to the whole of the northern area and may possibly be associated with cyclonic blows. After felling, these flaws, whether of the fissure or pipe type, remain comparatively stable, though they may penetrate through the greater part of the commercial length of the tree.

(*b*) Ring shakes and their variations are common features in logs examined on ramps or in timber yards. If located near the periphery of the heartwood, they may not interfere greatly with bench manipulation of the log, but otherwise they may determine the angle of each cut in order to keep wastage to a minimum. In such logs the cutter may have to choose between incurring waste to procure a patterned veneer and sacrificing pattern for the maximum area of wood. In the log they appear as open fissures which, when traced to the point of origin in the stump, are parallelled by obvious weaknesses in the wood. The fissure of the shake is due to the joint influence of the impact at the time of felling and the shrinkage in log volume which takes place later. Logs which show shakes at the time of felling become progressively worse, for shakes tend to extend and often link up by fissures to a central flaw.

Though fissures serve as a convenient channel of escape for emerging adults, their presence or absence makes little or no difference to the development of the species in the log. In a faulty log, adults may escape either through fissures or through the outer surface, and normally both channels are in use, though if sapwood decay is far advanced, fissure

escape is the more important; hence, in the absence of fissures near the core of the log, adults can retrace their steps to the periphery through the ramifications of the burrow system and construct independent exits.

Some infestation does take place through fissures, but only near the outside of the log. Apparently conditions in the inner recesses do not attract the insect. The absence of fissure infestation is mainly due to the unsuitability of the temperatures in the fissure for mass infestation. The actual loss of timber through the burrows initiated towards the outside of the fissure is normally not great, for the burrow systems initiated usually keep to the radial plane and the body of the log remains unaffected.

End infestation of a peculiar type has been observed in a defective water gum, *E. gustavioides*. A ring of tissue some 4 in. from the bark edge was riddled with entrance burrows of *C. grevilleæ*, while that on either side was free from attack. Particular rings of tissue similar to this are not uncommon, and may be due to irregular growth associated with over-maturity, the wood cutting white when dressed in the mill. Perhaps wood of this type represents a structural flaw in which the wood elements differ from the remainder of the log.

A further phenomenon associated with changes in the wood, but here due to fungal contamination, is frequently found in parts of a log showing signs of "doziness"—a tissue breakdown commonly found in logs. Heartwood tissue showing signs of incipient fungal breakdown frequently suffers attack on a heavier scale than healthy tissue alongside.

It seems clear from the examples cited that changes in the tissue of the wood due to a variety of causes may increase its susceptibility to pinhole borer attacks.

Natural Predators.

The described activities of *C. grevilleæ* are sufficient indication that for at least one phase of the insects' existence parasites can have little influence on the borer population. In the log predators of only the smallest dimensions can come in contact with the insect, and though Clerid larvæ are occasionally found within the burrow system, they apparently make no appreciable difference to the actual *grevilleæ* population; hence, once the burrows are initiated and inhabited by the two sexes, development proceeds normally. The only inhibitions of any consequence depend on the hardness of the wood and the virility of the fungi which take possession of the burrow walls. Should the log be one of the softer wood types—*e.g., Panax Murrayi*—normal disintegration may proceed so rapidly that the wood is reduced to pulp before the development of the insect can be completed, and larvæ, unable to thrive in such a medium, fail to mature. A further danger in such soft woods is to some extent associated with the first, for the growth of burrow-frequenting fungi is particularly rapid. It is not uncommon to find all stages of the insect enveloped in a mycelial mass, the growth of which has been too rapid for the insect population in the burrow system to control. Most rain-forest hosts, however, permit the normal development of the insect, and predatory influences within the burrow are slight.

The free-living habits of the insect are almost unknown except when infestation of a log is taking place and susceptible surfaces are crowded with adults seeking to penetrate the log. They are then subject to predatory dangers, for they lack adequate means of self-defence and

work in exposed situations. It is not surprising that rain-forest Formicids should carry off a considerable number of the borers. Three species are implicated:—

(*a*) *Chalcoponera impressa* Mayr. captures the adults as they move over the surface of the log prior to initiating burrows. It is particularly vindictive and very rarely loses its prey. Not only vagrant adults are taken, but males within the burrow system may be captured as they thrust burrow débris through the outside opening. The hind portion of the body is then extruded, and the ant often remains poised above the burrow opening waiting for a favourable opportunity to seize its prey.

(*b*) *Meranoplus puryi* For. is a smaller species which is more timid in habit than the former. Though it does sometimes capture adults, it is by no means so effective a predator as *C. impressa*; hence, though it may capture the prey either on the surface of the log or at the mouth of a burrow, the victim may be dropped should it show any considerable resistance. Most of the successful captures are injured borers.

(*c*) *Pheidole* sp. is a minute fulvous form smaller than the borer on which it preys. It wanders less than the preceding species and haunts stumps rather than the felled log. It may there be found carrying off *C. grevilleæ* in a very efficient manner.

The Clerid *Omadius yorkensis* Kuw. may also occur on the log surface frequented by borers. As would be expected from its systematic affinities, it is predatory in habit.

These four predatory insects are found on most logs subject to *grevilleæ* infestation and readily destroy any of the borers with which they may come in contact. It is doubtful, however, if they hinder the successful exploitation of a log. There are many reasons for this. The bulk of the burrows are initiated during the first day after the exposure of the sapwood. An influx of predators to a log presupposes an earlier invasion by their prey, and there must always be an interval between the two events. This interval, even if relatively short, gives the males sufficient time to burrow into the wood, for the predatory insect population is not high until a week or so after felling. These predatory insects therefore exercise no appreciable limitation on the number of burrows initiated within a week after felling a tree. Predators may, however, frequent the log concurrently with the females of *C. grevilleæ* and thus impede the normal juxtaposition of the sexes in any one burrow. This may account for the occasional phenomenon in which a log or part of a log is infested with males unpaired even after a lapse of some months. Predators may also limit subsequent infestation on surfaces exposed after the log has been cut.

Burrows sometimes harbour a considerable mite population which preys on the immature stages of *C. grevilleæ*. The net effect may not be great unless the insect population in a restricted wood or bark area is high. Under special circumstances, the loss is appreciable, a common example being found where bark infestation has taken place in mature logs. Infestation has in this case been stimulated by injury to the superficial bark layers, but the burrow system cannot be carried through to the sapwood, and immature forms crowd the limited burrow system which can be constructed in the bark itself. Apparently, conditions

within the bark burrows are suited to the rapid multiplication of the mite, and the larval mortality of the borer may be very high.

In spite of the variety of predators which are partial to *C. grevilleæ* both inside and outside the burrow system, it has to be concluded that their net effect is not great, particularly if weather conditions are suitable for mass infestation and the host log suitable for free development of the burrow system.

BARK RESISTANCE IN THE WALNUT BEAN.

It has already been noted that intact bark is capable of effectively protecting logs from pinhole borer attacks for some months after felling, and this fact has been used, in the previous paper, to suggest logging practices for surmounting ordinary borer difficulties. *C. grevilleæ* does, however, attempt to penetrate the bark, for in many logs small incipient burrows penetrating to a depth of 1 mm. or thereabouts are common. During 1932-34 a number of walnut bean logs varying in girth and bark thickness, characteristics depending on the age of the parent tree, have been under observation. In some of these *C. grevilleæ* penetrated the bark within three months of felling and infested the sapwood. In some instances, though cracks were absent from the bark, the discolouration of the underlying sapwood indicated that moisture soakage through it had already taken place. The insect-infested logs were of non-commercial size with a bark thickness of 8 mm., in contrast to the 12 mm. and upwards mean bark thickness of commercial logs; hence, while the generalisation on bark resistance holds good for the trade, the early breakdown in younger logs suggests an inquiry into the basis of bark resistance to the attacks of *C. grevilleæ*.

Resistance can be of only two types—chemical and mechanical. Were the former the case, some constituents of dead and dying tissues which constitute the greater part of the bark should be inimical to the activity of the insect. Were such constituents of the bark extractable, the liquor should have the property of preventing infestation in wood surfaces otherwise susceptible. An extract was prepared from walnut bean bark by the usual method employed in the manufacture of tannin liquor—*i.e.*, by leaching shredded bark for three hours at a temperature of 60 deg. C. The liquid showed some viscosity and was subsequently broken down with an equal quantity of water for actual log treatment. This extract ought to contain the usual contents of tannin liquors, including the gums, starches, mucin, zylans, inulin, and pectin. Surfaces dressed with the diluted extract actually suffered greater infestation than untreated sapwood, and it would appear that an aqueous bark extract has attractant properties. The heavy infestation of injured though unbroken bark confirms this conclusion. Though the bark after the removal of its water-soluble contents may still possess repellant properties, the behaviour of the aqueous extract suggests that bark resistance to attack is not due to its chemical constitution.

The alternative thesis—*i.e.*, that the mechanical properties of the bark determine its resistance to pinhole borer attack—is supported by both the behaviour of the insects and the macrostructure of the bark. The bark of the walnut bean (Plate 186, figs. 2 and 3) is not a homogeneous layer of variable thickness clothing the sapwood. It consists of at least three layers—

(*a*) An outer layer, homogeneous in structure, reddish in colour, and 1 mm. in thickness.

(*b*) A thin white subsurface layer which is quite hard and capable of being flaked with a scalpel.

(*c*) A diffuse layer comprising the greater part of the bark and made up of a crumbly corklike matrix, in which are interspersed columns of sclerophyllous tissue.

The sclerophyllous columns are roughly circular in cross-section towards the inner part of the bark, but near the periphery disintegration and coalescence take place; consequently, irregular masses of disintegrating sclerophyllous columns are strewn through the matrix, with some concentration near the subsurface layer cited as (*b*). Abortive burrows are common phenomena in logs of all ages. They penetrate layer (*a*), but stop short at layer (*b*); hence it would appear that the borer-resistant properties of the bark depend almost entirely on the latter. If the tree is of sufficient age as expressed in terms of commercial utility, this layer is complete, though of no considerable thickness, but in immature trees its evenness is less evident and thickness less obvious. It seems clear, therefore, that this layer has much to do with some of the characteristic properties of barks. Ordinarily, some months pass under rain-forest conditions before it ceases to afford protection. Water naturally or artificially applied then soaks through the matrix of the bark as a necessary preliminary to its being shed from the sapwood. In open country the breakdown is accompanied by a considerable amount of splitting, but in the rain-forest fungal penetration with associated rotting are more evident features. The natural process of bark-shedding can be greatly accelerated by the removal of the superficial layers (*a*) and (*b*) with either a rasp or a sharp knife. Pinhole borer infestation then takes place immediately through the matrix of the bark and later through the sapwood exposed when splitting takes place. Some months must elapse after felling before bark breakdown is similarly advanced under ordinary conditions, and it must be concluded that the weather-proofing and borer-resistant properties of the bark are largely attributable to the subsurface layer (*b*) and proximate parts of the bark lying close to the periphery.

In young trees of non-commercial girth the development of layer (*b*) is less advanced than in most commercial logs, and their bark breaks down more quickly; consequently, they cease to be borer-proof even before splitting has been initiated—within three months in some susceptible material. The balance between susceptibility and non-susceptibility to *grevillea* attacks in the walnut bean must therefore depend on the superficial layers of the bark and the amount of weathering to which the log or tree is subject. The main influence of weathering depends in turn on the prevalence of contact moisture, which tends to break down the soluble products concentrated in and near layer (*b*). When precipitation is high during the summer months, natural bark breakdown is rapid, though the protection which the bark gives to the log still covers some months.

In logs from which the superficial bark layers have been removed, bark infestation is as great, if not greater, than on exposed sapwood surfaces attacked at the same time; but, curiously enough, subsequent development may not be normal. Given reasonable weather after infestation of the sapwood, the burrow system is rapidly extended and populated with immature forms. After bark infestation in logs cut from mature trees, however, the sequence of events may be quite different.

Burrow development is here inhibited at an early stage, though reproduction continues normally; consequently, some experimental material showed the remarkable phenomenon of heavy infestation and reproduction in the outer half of the bark only, immature forms being crowded together. The burrows lacked any definite orientation, and at the end of a few months had quite an aged appearance, the walls being almost black. Possibly in time the bark may be penetrated and an entrance effected into the sapwood, but it is interesting to note that normal development of the burrow system has been impeded by the inner bark. The limit of penetration coincided with the limits of weathering visible in bark sections.

Intact bark thus hinders the initial infestation of the log, while adults which enter injured bark surfaces may not be able to extend the burrow system to the sapwood. These properties of the bark are apparently due to physical features, layer (*b*) resisting primary infestation, while the closely apposed sclerophyllous columns of the inner bark hamper burrow extension. The experimental data are almost entirely drawn from walnut bean studies, but a comparison of barks in a number of commercial species suggests that the conclusions are similarly applicable, though both the hardness of layer (*b*) and the disposition of the sclerophyllous tissues differ considerably.

[TO BE CONTINUED.]

QUEENSLAND SHOW DATES, 1935.

June.

Marburg, 1 to 3.
Gin Gin, 1 to 3 .
Childers, 3 and 4.
Emerald, cancelled.
Wowan, 6 and 7.
Bundaberg, 6 to 8.
Lowood, 7 and 8.
Warrilview, 8.
Boonah, 12 and 13.
Gayndah, 12 and 13.
Gladstone, 12 and 13.
Esk, 14 and 15.
Rockhampton, 18 to 22.
Mackay, 25 to 27.
Laidley, 26 and 27.
Proserpine, 28 and 29.

July.

Bowen, 3 and 4.
Ayr, 5 and 6.
Townsville, 9 to 11.
Kilcoy, 11 and 12.
Cleveland, 12 and 13.
Rosewood, 12 and 13.
Charters Towers, 16 to 18.

July—continued.

Nambour Show, 18, 19; Campdraft, 20.
Cairns, 23, 24, 25.
Atherton, 30 and 31.
Gatton, 31 July and 1 August.

August.

Caboolture, 2 and 3.
Pine Rivers, 9 and 10.
Royal National, 19 to 24.
Home Hill, 30 and 31.

September.

Brisbane River Carnival and Campdraft, Esk, 6 and 7.
Imbil, 6 and 7.
Pomona, 13 and 14.
Tully, 13 and 14.
Rocklea, 14.
Beenleigh, 20 and 21.
Innisfail, 20 and 21.
Kenilworth, 28.

October.

Malanda, 2 and 3.

A Novel Moth Lure.

By HENRY HACKER, F.R.E.S., Entomologist.

RECENTLY a very interesting spider was forwarded to the Department of Agriculture and Stock for identification, and as it possesses some remarkable habits, a short account of these may be of general interest.

Most spiders catch their prey by means of a web or snare. The species now under discussion—*Dicrostichus furcatus* Cambridge—belongs to a group the members of which, however, are able to attract moths by means of a lure. Its nest or retreat is usually in a small tree or shrub and consists merely of a few leaves drawn together with threads.

PLATE 187.

Dicrostichus furcatus Camb. Female spider with lure × 2.

This spider is nocturnal, and when hungry it comes out of its retreat and spins a few inches of silken thread; one end of the thread is fastened to a twig, while to the other is attached an extremely sticky globule. The spider then takes up its position, holding the thread by one of its legs, and patiently awaits its victims (Plate 187). When a moth approaches, the spider whirls the sticky globule around. The nature of the attraction possesed by this globule is not known, but the moth invariably becomes attached to it. Moderate-sized Noctuid moths as well as smaller Lepidoptera have been observed falling victims to this attractive lure. When the spider effects a capture, it hauls up the thread, binds the moth with further threads, and proceeds to suck its juices.

The egg-bags of this species are very conspicuous objects; as many as four or even five may be seen suspended near the retreat, all being the work of a single female. They are nearly 2 in. in length, pale testaceous brown, wide at the point of attachment, then sharply contracted into a narrow neck, beyond which they are spindle-shaped. The outer skin is of smooth parchment-like texture; the interior is thinly lined with loose silk and filled with white globular eggs.

The young spiders hatch inside the bag and duly penetrate to the outer envelope, which they pierce. On emergence, each one spins a fine silken thread, then, loosening its hold, floats away. By this means they are dispersed for considerable distances from the original spot at which they hatched out.

HOW TO HOLD THE REINS WHEN RIDING.

During a discussion recently among a number of horsemen the growing practice to hold the reins when riding with both hands was severely criticised and defended with equal vigour by those who contended that it was the correct manner. Those who uphold the use of one hand only have solid backing for their views. Take the army as a case in point. Riders use only one hand, usually the left. The mounted police in this State use only one hand.

A dip back into the pages of the past depicting riders of other days, esquestrian statuary and paintings of horsemen of olden times will disclose riders with the reins in but one hand. It is the universal practice among Australian stockmen. In hunting or galloping, however, it is usual to use both hands.

Of late years the number of riders appearing in the show ring who use both hands has been very pronounced. No doubt this is the outcome of training in early youth. It is held by some that riders of this style maintain more effective control over their mounts. But what of such riders as the mounted police, who, time and again, have demonstrated the control they have over their mounts when riding with one hand?

Would it not be possible to set up some standard of horsemanship for the guidance of show judges as is done in other countries? In common with using both hands on the reins there has been a decided tendency for riders of the younger generations to use a very short stirrup—quite alright for hunting or galloping, but which looks out of place in the show ring.

It would be interesting, therefore, to have the views of experienced judges on these and other points upon riding in the show arena and elsewhere.—"Book Book" in "Country Life."

Quality in Bright Tobacco and Home Grading.

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THERE is no doubt the dissatisfaction expressed by many tobacco growers at their inability to sell or to secure adequate prices for their product would be largely obviated if the essentials of quality were better understood.

Complaints are made of inconsistency in the offers for lots of high grade leaf that growers maintain were of equal quality, but the greatest outcry is due to the low prices realised, or the lack of offer, for dark and inferior leaf.

In the absence of keen competition amongst purchasers, it is probable the prices for even grades of good quality may vary somewhat, but is has not been observed that such disparity was, in any season, extraordinarily remarkable. The prices, however, paid for inferior grades have shown divergences for which satisfactory reasons cannot be adduced. Such disparities infer that below a certain standard the degree of quality is not always a determining factor. They certainly show very plainly that inferior grades are not desired.

In any question there are at least two points of view, in that of quality of tobacco, there are certainly three—namely, the grower's, the manufacturer's, and the consumer's. Of these, that of the last named is the most important, since his inclination impresses the manufacturer and thus influences the demand from the grower. In this direction buyers have shown by their ready purchase that all bright grades, exclusive of trashy leaf, as well as the best of dark grades, are in good demand and by their reluctance that inferior grades, especially of leaf harvested under-ripe, are not desired.

In Australia the average quality of tobacco demanded by the consumer has been stated by competent authorities to be superior to that in other lands. This is no doubt due to the fact that until quite recently well over 90 per cent. of that consumed was imported in leaf form or already manufactured. As duty is paid on weight without regard to quality, it is improbable inferior leaf received any consideration from importers. Growers, therefore, should fully realise Australian consumers, on the whole, desire a quality to which they are accustomed and cannot be expected to take kindly to an inferior article. Also, the habit of smoking is encouraged by the satisfaction experienced therein. Any measure calculated to enforce the consumption of an inferior quality, such as by a partial or total prohibition of import or by the imposition of such an increase in duty as would result in the price of the article rising beyond reach, could not be calculated to help the grower. Rather would consumption rapidly decline and the market be still confined to leaf of reasonably good quality.

It should also be remembered that popular taste in tobacco has shown a marked alteration, especially in the last twenty years. Such a change appears concurrent with the general adoption of the flue-curing process. Efficiently so cured the leaf, when grown under the most

suitable conditions of soil and climate and harvested at the correct stage of ripeness, possesses a natural flavour and aroma, so satisfactory as not to suggest possibility of improvement. As a result of this, a modification in the process of manufacture eventuated. Formerly it was the practice to treat the leaf with various sauces, to add aromatic substances and by other agencies, to overcome deficiencies or seek improvement in flavour and aroma. To-day the art of manufacture consists most largely in the blending of various grades of leaf to secure a degree of natural flavour and aroma calculated to make the greatest appeal to the consumer. The reagents now employed in the process of manufacture, being in themselves neutral, are not calculated to cover any deficiency or to add in any way to quality.

As is well known, leaves borne on different parts of the plant and classed, respectively, as lugs, wrappers, fillers, and cutters, vary in size (superficial area) and body (thickness) with the climatic conditions and the class of soil on which the plant is grown. In proportion as body increases so does the content of nicotine and other properties that combine to produce flavour and aroma.

The smoking aroma also will vary somewhat with the district—more particularly in relation to degrees of latitude in Australia—and with the country. Regarding the latter there is a pronounced difference between the aromas of Australian, African, American, and Asiatic tobaccos, though the best of each is most agreeable.

Further, the aroma of certain kinds of tobacco leaf such as Burley, Turkish, &c., are distinct from that of bright tobacco wherever grown. In addition, the ageing or storage of leaf under appropriate conditions for a year or more is found to result in improvement in smoking quality. A parallel to this is suggested in the ageing of wine or whisky when held in wooden casks. The reason of the improvement is not understood and, so far, no process has been found to produce the same effect with either tobacco or wine. The storage of tobacco leaf, however, beyond a year, appears to be confined to the choicer grades, of which the supply is not certain each year. Manufacturers thus have at their disposal Australian leaf of varying degrees of strength (flavour and aroma) according to body and the district in which it was produced. They are also able to import from other countries bright leaf and leaf of other kinds in which flavour and aroma are distinct from Australian as well as each other. Opportunity is consequently afforded to blend Australian leaf of various grades in definite proportions to secure smoking mixtures calculated to satisfy the varied requirements of consumers.

Under competition, it is natural for efforts to be made to secure a greater share of patronage by providing further blends to titillate the palate. Thus leaf from foreign countries and of other kinds are used wholly or as admixtures.

With such an objective it cannot be expected that inferior grades of leaf will meet with consideration. Growers should be aware the demand for quality leaf is instituted primarily by the consumer. Also that when the price of the manufactured article is increased, economy will be effected in other directions or consumption lessened rather than attention be given to a cheaper and less satisfying substitute.

Quality Essentials.

The qualities of bright tobacco may be determined as "burn," "ash," and "aroma" in regard to smoking characteristics, and "size," "colour," and "texture" to leaf appearance.

Burn.—The ability of the cured leaf, when manufactured, to hold fire will be recognised as most important. When a pipe or cigarette has to be continuously drawn upon to keep the tobacco alight the burn is suggested as very poor. On the other hand when a cigarette or pipe can be set down for two or three minutes without a cessation of combustion the burn is characterised as very good or excellent. Similarly with the leaf alone, when the glow ceases immediately it is taken from contact with a flame, it is said to have a bad burn, while if the line of fire proceeds slowly and evenly without flame or coaling for some seconds it is proportionately classed as fair, good, very good, or excellent.

A bad burning quality is generally due to an excess of chlorides in the soil frequently associated with sodium as common salt in areas close to the sea. The burn of Queensland tobacco leaf in present producing districts has been found to be uniformly good.[1] Care, however, should be exercised in the inclusion of chloride or muriate of potash in the fertilizer mixture as an excess beyond 2 per cent. besides exerting an unfavourable effect on the burning quality of the leaf is said to injure growth and produce a thick brittle leaf which, when cured, becomes thin soggy and dull in colour.[2]

Excess of nitrogen also is liable to affect the burn[3].

The burn of immature leaf is much less satisfactory than of that allowed to ripen on the plant.

Ash.—The colour and consistency of the ash of Queensland tobacco is also generally satisfactory[1]. It should preferably be light in colour, white to grey, rather than darker, and should be fine and soft to touch. The formation of a coal is not desirable.

Aroma.—It is somewhat difficult to define exactly what is covered by the term "aroma," since it includes the fragrance, or otherwise, noted by the olfactory nerves and the flavour and general effect registered on tongue and palate. The quality of aroma may be described as from poor to excellent, light to full flavoured, mild to very strong, and passable to agreeable, or, pungent, sharp, bitter, acrid, objectionable, &c., according to the effect experienced.

A good or agreeable aroma will be evidenced by a soothing effect on tongue and palate, accompanied by a feeling of fulness without heat in the mouth when the smoke is drawn in and a pleasurable effect on the sense of smell.

The taste of the cured leaf when chewed is also a guide to quality in smoking aroma; it should possess a degree of sweetness.

The quality of aroma as was previously noted varies with the district and again with the country in which it is grown. In each case it may be quite distinct but at the same time wholly satisfactory.

The degree of aroma or the amount present in the leaf is dependent on the texture, the position of the leaf on the plant, and the stage of ripeness when picked. It varies with varieties and with quality is affected by the soil and climate during growth. The middle leaves

being the largest leaves and also heavier bodied than others on the same plant, possess a greater degree of aroma than cutters or thin leaf, much of which is almost neutral or the degree of aroma so light as to be hardly perceptible. By blending leaves of differing body the degree of aroma is controlled in the manufactured article, while the quality may not be altered. By blending leaf of different kinds of tobacco, as well as that from different districts and countries, the quality, as well as the degree of aroma, is influenced. Leaf picked at the correct stage of ripeness and efficiently cured presents a much superior appearance and possesses flavour and aroma to a fuller and more acceptable degree than when harvested either under or over-ripe.

A parallel may be noted in the greater attractiveness of dessert fruits when allowed to become fully ripe before being picked from the tree.

In proportion as the harvested leaf departs from full ripeness so will its smoking quality decline. Over-ripe leaf when cured is found to have less aroma and usually carries an amount of dead tissue proportionate to the period beyond which it should have been picked.

Under-ripe leaf also carries less aroma both in quality and quantity and, as it declines from ripeness, presents a more or less bitter and disagreeable flavour.

Though under-ripe leaf may by skill be cured a more or less yellow colour, buyers will detect immaturity by the leaf odour, which becomes more rank and objectionable with departure from ripeness.

Disease and frost are not infrequently the cause of defective aroma.

Rootrots and nematode infection induce a yellowing of leaf on the plant much earlier than the period of normal ripening. This colouring presages the decay of the leaf from lack of nutrition due to the defective root system. Such leaf is, of course, more or less under-ripe.

Heavy applications to the soil of dung or other manures which induce a rank growth through excess of nitrogen can also be responsible for bad aroma. Where suckering is neglected the aroma of the leaf is less in quantity rather than quality.

There has been some disagreement amongst authorities as to the relative importance of soil and climate in influencing aroma in tobacco, but in recent years preponderance of opinion suggests that the character or quality of the aroma is due to the soil and its degree or quantity to climatic influence.

Little is known of the leaf constituents responsible for aroma in tobacco or of any method of soil treatment that would result in improvement. It is, however, known that by certain additions it can be impaired, so it is reasonable to suppose the result of experiments in that direction may influence improvement in the future.

Slagg[1] found that ripe leaf grown in most of the Queensland districts possessed a good aroma. Manufacturers also, by their ready purchase of good textured leaf from all producing districts, have indicated appreciation thereof.

Being cognisant of the smoking characteristics of leaf from each district, buyers do not find it necessary to make a test before each

purchase. They are guided in estimation of quality by leaf appearance, particularly in regard to colour and texture.

Colour.

As indicated previously the smoking qualities of tobacco leaf covered by the term "aroma" are influenced by the soil on which it was grown, the seasonal conditions then operating, the stage of ripeness at which it was picked, and the efficiency of cure. Brightness of colour is an indication of the degree of ripeness attained when the leaf was picked and of the efficiency of cure. Its degree or lustre is definitely influenced by the amount of organic matter in the soil.

In fully-ripe, well-grown leaf that has been properly cured the colour range from lemon to dark will indicate increase in body. Under such conditions it would be equally impossible to properly cure a heavy leaf a lemon colour or a light leaf mahogany or dark.

The colour range may be described as follows:—

Lemon.—The colour of a freshly ripened lemon or that of flowers of sulphur.

Orange.—As suggested, the colour of a freshly ripened orange or a deeper and more pronounced yellow than lemon.

Bright Mahogany.—Yellow with a reddish cast to pale red, sometimes barred with light red and yellow.

Mahogany.—Bright red or in which a red colour predominates.

Dark.—Dark red to a ruddy brown.

Green.—As its name implies, any leaf wholly green or which has a decidedly green cast.

Colour shades may be expressed as (*a*) pale; (*b*) light; (*c*) true colour; (*d*) dusky; and (*e*) dark.

Finish.—The term "finish" alludes to the general appearance of the leaf, and is described as (*a*) flashy or bright; (*b*) clear; (*c*) normal finish; (*d*) dull; (*e*) cloudy; and (*f*) dingy.

Flash Tobacco.—There is a shining brightness as if the surface of the leaf reflected light, frequently associated with leaf from the first crop on virgin soil; also on soils in which the supply of organic matter is kept up. This by manufacturers is termed "flash tobacco," and always commands, other qualities being equal, a better price.

In certain manufactures where brightness of colour is considered an additional attraction to smoking quality such leaf is eagerly sought.

Clear Finish signifies absence of blemish from sponging during cure, injury from disease, insects, &c., or damage from other cause.

Normal, dull, cloudy, and *dingy* finishes are sufficiently informative, and suggest full or insufficient ripeness, over-ripeness, or inefficient curing. In the latter three the trouble is frequently caused when the barn is filled with leaf of unequal ripeness or when rise of temperature is unduly delayed or ventilation is faulty. "Sponging" is a term commonly applied to defective finish.

Fibre Colours.—In relation to the leaf colour, that of the veins is determined as conforming, blending, emerging, contrasting, and clashing.

Leaf Aroma.—This is distinct from what is generally understood by aroma as a smoking quality, and refers to the odour of the leaf, particularly when a quantity is freshly drawn from the bulk or package. Ripe leaf presents a sweet, attractive odour suggestive of honey. A barn of freshly cured ripe leaf often emits such a perfume when the door is opened. Also in the bulk shed the aroma of the cured ripe leaf is usually pronounced and remarkably pleasant. In proportion to the decrease from ripeness of the leaf when picked, so will the sweet odour be lessened or replaced with a rank, nauseous, and objectionable smell. "Wet dog" is a buyer's term for the disodour associated with cured unripe leaf. Though skill in curing may secure a more or less yellowish colour or one free from green in such leaf, it cannot dissemble the particular leaf aroma peculiar thereto. This quality of leaf aroma may possibly explain the variations in price of which much complaint is made by growers.

Maturity.—This is decided by colour and leaf aroma as (*a*) overripe; (*b*) mellow or thoroughly ripe; (*c*) ripe; (*d*) unripe; (*e*) immature; and (*f*) crude.

Cure.—This is expressed as well cured or by names indicating certain characteristics of excessive, insufficient, or improper curing.

Cleanness.—Freedom from foreign matter—*e.g.*, dirt, suckers, string, &c.

Texture.

Under the general term of "texture" are grouped a number of qualities determined by superficial observance as well as during handling. They may be briefly described as follows:—

Soundness.—(*a*) Sound (free of damage); (*b*) unsound (under 20 per cent. damage); (*c*) badly damaged (over 20 per cent.) The term "damage" refers to the effect of fungus or bacterial diseases which attack tobacco leaf after it has been flue-cured, such as mould during bulking; it includes tobacco having the odour of mould, must, or rot.

Injury.—This is distinct from damage, and is defined as hurt or impairment from any other cause. Injured tobacco shall include any dead, burnt, hail-cut, or ragged leaves; or leaves that have been torn or broken, frozen or frosted, sunburned or scalded, scorched or firekilled, bulk-burnt or steam-burnt, pole-burnt or house-burnt, bleached or bruised; or discoloured or deformed leaves; or tobacco hurt by insects; or tobacco having an odour foreign to the type; or tobacco affected by rust, frog-eye, mosaic, frenching, or other diseases. It is expressed as the amount or percentage of injury.

Flatness.—(*a*) Flat; (*b*) even or plain surface; (*c*) wavy, shrunken, or loosely drawn; (*d*) crinkled or puckered; (*e*) wrinkled or tightly drawn; and (*f*) curled, twisted, or distorted.

Texture.—(*a*) Fine; (*b*) good; (*c*) medium; (*d*) fair; (*e*) poor.

Smoothness.—(*a*) Silky; (*b*) smooth; (*c*) unrough; (*d*) coarse; and (*e*) rough.

Grain.—(*a*) Grainy, and (*b*) not grainy or free of grain.

Porosity.—(*a*) Spongy; (*b*) porous; (*c*) open weave; (*d*) close weave; and (*e*) tight weave.

Oil (or Life).—(*a*) Fat; (*b*) rich in oil; (*c*) oily; (*d*) lean or low in oil; and (*e*) lifeless or dead.

Wax.—(*a*) Waxy, and (*b*) free of wax.

Solidity.—(*a*) Hard or woody; (*b*) compact; (*c*) firm; (*d*) flabby; and (*e*) flimsy.

Body.—(*a*) Thick or heavy; (*b*) fleshy; (*c*) medium body; (*d*) thin; and (*e*) tissuey.

Strength (Tensile).—(*a*) Tough; (*b*) strong; (*c*) normal strength; (*d*) weak; (*e*) tender.

Elasticity.—(*a*) Elastic; (*b*) semi-elastic; (*c*) stretchy; and (*d*) non-elastic.

Fibre Size.—(*a*) Fine fibres; (*b*) small fibres; (*c*) medium fibres; (*d*) large fibres; and (*e*) coarse fibres.

Venation.—Expressed as the number of degrees in the average angle between the main fibres (veins) and the midrib.

Width.—(*a*) Broad; (*b*) spready; (*c*) normal width; (*d*) narrow; and (*e*) stringy.

Length.—When length is not of sufficient importance to be treated as a separate factor, it is treated as an element of quality.

Shape of Tip.—(*a*) Round; (*b*) oblate or normal tip; and (*c*) sharp or pointed.

Grading.

The foregoing is designed to give some indication of what constitutes quality in flue-cured tobacco and to stress the fact that ripeness of leaf at harvest is the first essential thereof.

As the smoking qualities of aroma, burn, and ash from present Queensland producing districts are accepted as satisfactory by manufacturers provided the leaf was sufficiently ripe when picked, their offers of purchase are consequently based on the visible characteristics of size, colour, texture, injury, and damage. Leaf in which quality is uniform neatly tied into medium-sized hands provides an attraction to the buyer, and invariably results in a more profitable return than would be the case if colours were mixed, quality varied, lengths too uneven, and hands roughly tied.

Standard Grades.—In a systematic classification of leaf it would first be divided into groups suggestive of body or thickness with attendant quality and its use in manufacture. Each group would then be divided into colours and further separated into a number of qualities dependent on leaf characteristics and injury or damage, if any.

With some experience the grower could more or less easily separate his leaf into groups and colours, but would meet difficulty in accurately grading into definite qualities.

A standard of grades would suggest a corresponding scale of prices as a desirable concomitant. Needless to state such a combination would require a degree of accuracy in classification hardly possible on the average farm.

A leaf warehouse, preferably on co-operative lines, with a trained staff to determine quality and to further classify when necessary, could be calculated to economically overcome defects in home grading. Such an organisation, provided standard grades and prices were adopted, would naturally become a selling agency through which possibly advances on leaf could be secured and growers' requirements supplied at minimum cost. It would suggest control of the industry by growers and the practicability of co-operative manufacture to counter any understanding among buyers to control prices.

A further advantage and one which would favour the monetary return to the grower would be the buyers' knowledge that leaf from such a leaf warehouse would be dependable not only in accuracy of classification but in storage condition.

At the present time much of the leaf received at factories has to be carefully examined as to grade and to be reconditioned for storage. The expense of this being obviated, would probably allow an advance in price equivalent to the charges of the leaf warehouse in that respect.

Standard grades have been established for many types of tobacco in the United States of America, and are utilised in the activities of the tobacco-grading service maintained by the Bureau of Agricultural Economics in co-operation with State Departments of Agriculture or similar administrative units there.

The function of the tobacco-grading service in so far as the auction markets are concerned is to inspect the tobacco delivered by farmers and label it according to its grade before the sale takes place. The grade is announced to the buyers, so that they as well as the growers are apprised of the grade and quality of the tobacco according to United States standards. As a part of this service the sales of graded tobacco are analysed, and reports are issued daily that show the average prices paid for each grade. By furnishing the grower information on the grade of his tobacco and the average selling price he is enabled to judge intelligently whether the price is reasonable and whether he should accept the sale. It is found at times the mere announcement of the official grade of given lots of tobacco enhances the prices paid to the growers.[4] The standard grades for flue-cured tobacco formulated by the United States Department of Agriculture,[5] to which pleasurable acknowledgment is given for assitance in defining the elements of quality, &c., provides for divisions as follows: —

Groups.	*Qualities.*	*Colours.*
A—Wrappers	1—First quality ..	L—Light or lemon
B—Leaf	2—Second quality ..	F—Medium or orange
C—Cutters	3—Third quality ..	R—Red or mahogany
X—Lugs	4—Fourth quality ..	D—Dark red or walnut
N—Nondescript ..	5—Fifth quality ..	G—Green or green mixed
S—Scrap	6—Sixth quality ..	

The adopted order of grade marks is as follows:—Group factor first, quality factor second, and colour factor third. Thus wrapper leaf would be given the factor A for the group, the second factor would refer to the quality (as first, second, or third), while the third factor would refer to its colour. In this manner A 1 L would represent wrappers of first quality in lemon colour, B 3 R would represent leaf of third quality in red or mahogany colour, and so on.

Provision is made for special factor symbols to form subgrades by placing a particular letter signifying same after or above the standard grade symbol. These, of course, would rarely be applied to properly graded leaf unless to qualify smoking leaf or primings.

Group Definitions.

Wrappers.—Any leaf which is clean, sound, smooth, elastic, oily, ripe, firm, and strong, and which has a bright finish, small to medium-sized and blending fibres, normal width, and not more than 5 per cent.

injury. In the wrapper grades a minimum length or size may be specified and a tolerance provided for leaves other than wrappers.

Leaf.—Tobacco which is medium to thick in body as compared with the average body of the type (in case leaf from different parts of the State is so determined) and which does not have the characteristics of lugs. Leaf is frequently referred to as heavy leaf, fillers, or tips.

Cutters.—Tobacco which is very thin to medium in body as compared with the average body of the type and which has the characteristics of lugs except with respect to injury and finish. Cutters are frequently referred to as thin leaf.

Lugs.—Any lot of tobacco, except nondescript and scrap, composed chiefly of comparatively thin and lean leaves, and showing a material amount of injury of the kind characteristic of leaves grown near the ground; or any tobacco, except nondescript and scrap, injured or containing lug leaves in excess of the tolerance allowed in the grades of the B and C groups. Lugs are ordinarily composed of leaves from near the bottom of the plant, and they are normally characterised by a dull or dingy finish.

Nondescript.—Any nested tobacco, or muddy or extremely dirty tobacco, or tobacco containing an unusual amount of foreign matter, or crude tobacco (very immature), or tobacco damaged to the extent of 20 per cent. or more, or tobacco infested with live tobacco beetles or other injurious insects, or wet tobacco, or incompletely cured tobacco, including fat stems and wet-butts, or very inferior lots of tobacco of the quality that is not ordinarily marketed, or tobacco having characteristics distinctly foreign to tobacco of other groups of the type.

Scrap.—A by-product from handling tobacco in both the unstemmed and stemmed forms, consisting of loose and tangled portions of tobacco leaves, except stems, which accumulate in warehouses, packing and conditioning plants, and stemmeries.

Smoking Leaf.—The thin side or characteristic of leaf grades having prominent fibres (bony leaf) and characterised by being non-elastic, low in oil, mellow, very grainy, porous, and showing a considerable amount of injury of the kind normally found in very grainy or overripe tobacco. Smoking leaf is determined a subgroup and designated by the letter "H" placed after or above the standard grade symbols.

Primings.—Any lugs composed of very thin, pale, silky, and premature leaves very low in oil and wax and of a dull and dingy finish. Priming lugs are the extreme opposite of grainy or overripe lugs. Primings should not be confused with the method of harvesting known as priming. Primings are treated as a subgroup and designated by the letter "P."

Qualities and Colours in each Group.—All qualities and colours shown in the divisions previously mentioned do not appear in each group of the American standards.

Wrappers are divided into three qualities and three colours only—namely, first, second, and third qualities in lemon, orange, or mahogany. Lower qualities and deeper colours than third quality in mahogany would be included in leaf or lugs according to body or thickness.

The *Leaf* group comprises six qualities in each of the lemon, orange, and mahogany colours. Neither first nor second qualities are considered when the colour is dark or green. In each of these colours the grades are, respectively, third, fourth, fifth, or sixth.

The *Cutter* group comprises first, second, third fourth, and fifth qualities in two colours only—lemon and orange. Deeper colours would be classed in the Lug group as well as a quality lower than fifth.

The *Lug* group comprises first second, third, fourth, and fifth qualities in lemon, orange, and mahogany only. There is no provision for dark colours, while green colour is placed in third, fourth, or fifth quality.

Nondescript and *Scrap* are not graded.

Uniformity.—The first essential in grading is to sort the leaves into lots of like group possessing similar qualities and colour. Values will be influenced by the degree of uniformity showing the percentage of a lot that may be of a distinctly different group, quality, or colour from the run of the lot. Such degree may be expressed as (*a*) uniform (less than 5 per cent.); (*b*) harmonising (less than 10 per cent.); (*c*) unmingled (less than 20 per cent.); (*d*) mingled or unmixed (less than 30 per cent.; and (*e*) mixed (over 30 per cent.). In American standard grades provision is made for subgrades. As explained previously under "Smoking Leaf" and "Primings," the letters "H" and "P," respectively, are applied to or in place of the group symbol.

Other special factor symbols are used after or above the grade marks to form other subgrades:—

K. *Off Colour.*—Tobacco of which 20 per cent. or more of its leaf surface has a grey, mottled, bleached, or foreign colour which does not blend with the normal colours of the type; or tobacco which does not blend reasonably well in its proper grade on account of some peculiar characteristic.

M. *Mixed.*—A lot of tobacco of which 30 per cent. or more of its leaves are of a *distinctly different* quality and/or colour from the run of the lot and which contains less than 20 per cent. green.

T *Tips.*—Self-explanatory.

V. *Greenish Tinge.*—Tobacco of which 20 per cent. or more of its leaf surface has a decided greenish cast; or tobacco which is not 20 per cent. green but which has 20 per cent. of green and greenish cast combined.

L. *Light Green.*—Qualifying a green grade.

D. *Dark Green.*—Qualifying a green grade. Green tobacco is so classed if 20 per cent. or more of its leaf surface is predominantly green in colour.

U. *Unsound* or damaged, under 20 per cent.

W. Doubtful keeping order.

Arrangements of Grades.

The following American standard grades are arranged according to group and quality. General specifications are shown for each group. Opposite each grade symbol is a grade name or description and its specifications. The specifications and descriptions cover only the three grade factors—group, quality, and colour. A careful study should be made of definitions, elements of quality, before applying the specifications:—

Wrapper Grades (A Group).

General Specifications.—All grades of the A group must be clean, sound, ripe, firm, strong, and over 16 inches long, must have an open

weave, light to true colour shade, clear to bright finish, and small to medium size and blending fibres.

General Tolerance.—Five per cent. injury of a nature affecting wrapper yield.

U S Grade.	Grade, Description, Specification, and Tolerance.
A 1 L ..	Choice quality wrapper in Lemon colour. Very silky, very fine texture, very elastic, oily, thin to medium body, spready, uniform. Tolerance: 20 per cent. leaves of a quality not lower than B 2 or C 3.
A 1 F ..	Choice quality, wrapper in Orange colour. Very oily, medium to fleshy body; otherwise same as A 1 L.
A 1 R ..	Choice quality wrapper in Red or Mahogany colour. Rich in oil, fleshy to heavy body; otherwise same as A 1 L.
A 2 L ..	Fine quality wrapper in Lemon colour. Silky, fine texture, elastic, oily, thin to medium body, spready, uniform. Tolerance: 40 per cent. leaves of a quality not lower than B 2 or C 3.
A 2 F ..	Fine quality wrapper in Orange colour. Very oily, medium to fleshy body; otherwise same as A 2 L.
A 2 R ..	Fine quality wrapper in Red or Mahogany. Rich in oil, fleshy to heavy body; otherwise same as A 2 L.
A 3 L ..	Good quality wrapper picker in Lemon colour. Fairly silky, good texture, semi-elastic, oily, thin to medium body, normal width, fairly uniform. Tolerance: 60 per cent. leaves of a quality not lower than B 2 or C3.
A 3 F ..	Good quality wrapper picker in Orange colour. Very oily, medium to fleshy body; otherwise same as A 3 L.
A 3 R ..	Good quality wrapper picker in Red or Mahogany colour. Rich in oil, fleshy to heavy body, otherwise same as A 3 L.

LEAF GRADES (B GROUP).

General Specifications.—All grades of the B group must be clean, sound, medium to heavy body, and must not exceed the tolerance specified with respect to injury and lugs.

U S Grade	Grade Description, Specification, and Tolerance
B 1 L ..	Choice quality leaf in Lemon colour. Very smooth, very good texture, stretchy, oily, ripe, firm, medium body, strong, normal width, open weave, light colour shade, bright finish, medium size and blending fibres, uniform. Tolerance: 5 per cent. injury.
B 1 F ..	Choice Quality leaf in Orange colour. Very oily, medium to fleshy body; otherwise same as B 1 L.
B 1 R ..	Choice quality leaf in Red or Mahogany colour. Rich in oil, fleshy body; otherwise same as B 1 L.
B 2 L ..	Fine quality leaf in Lemon colour. Smooth, good texture, stretchy, oily, ripe, firm, medium body, strong, normal width, open weave, fairly light colour shade, bright finish, emerging fibres, fairly uniform. Tolerance: 10 per cent. injury.
B 2 F ..	Fine quality leaf in Orange colour. Very oily, medium to fleshy body; otherwise same as B 2 L.
B 2 R ..	Fine quality leaf in Red or Mahogany colour. Rich in oil, fleshy body; otherwise same as B 2 L.
B 3 L ..	Good quality leaf in Lemon colour. Fairly smooth, fair texture, fairly oily, ripe, firm, medium body, fairly strong, normal width, true colour shade, clear finish, harmonising. Tolerance: 15 per cent. injury.

B 3 F .. Good quality leaf in Orange colour.
Oily, medium to fleshy body; otherwise same as B 3 L.

B 3 R .. Good quality leaf in Red or Mahogany colour.
Rich in oil, fleshy body; otherwise same as B 3 L.

B 3 D .. Good quality leaf in Dark Red or Walnut colour.
Rich in oil, heavy body; otherwise same as B 3 L.

B 3 G .. Good quality leaf in Green colour.
Quality of B 3 or better, except maturity.

B 4 L .. Fair quality leaf in Lemon colour.
Unrough, fairly ripe, medium body, normal strength, not stringy, fairly true colour shade, fairly clear finish, unmingled. Tolerance: 20 per cent. injury and 10 per cent. lugs of the quality of X 3 or better.

B 4 F .. Fair quality leaf in Orange colour.
Medium to fleshy body; otherwise same as B 4 L.

B 4 R .. Fair quality leaf in Red or Mahogany colour.
Fleshy body; otherwise same as B 4 L.

B 4 D .. Fair quality leaf in Dark Red or Walnut colour.
Heavy body; otherwise same as B 4 L.

B 4 G .. Fair Quality leaf in Green colour.
Quality of B 4, except maturity.

B 5 L .. Low quality leaf in Lemon colour.
Fairly ripe, medium body, dusky colour shade, dull finish, unmixed. Tolerance: 30 per cent. injury and 20 per cent. lugs of the quality of X 3 or better.

B 5 F .. Low quality leaf in Orange colour.
Medium to fleshy body; otherwise same as B 5 L.

B 5 R .. Low quality leaf in Red or Mahogany colour.
Fleshy body; otherwise same as B 5 L.

B 5 D .. Low quality leaf in Dark Red or Walnut colour.
Heavy body; otherwise same as B 5 L.

B 5 G .. Low quality leaf in Green colour.
Quality of B 5, except maturity.

B 6 L .. Common quality leaf in Lemon colour.
Fairly ripe, medium body, dark colour shade, dingy finish. Tolerance: 40 per cent. injury and 30 per cent. lugs.

B 6 F .. Common quality leaf in Orange colour.
Medium to fleshy body; otherwise same as B 6 L.

B 6 R .. Common quality leaf in Red or Mahogany colour.
Fleshy body; otherwise same as B 6 L.

B 6 D .. Common quality leaf in Dark Red or Walnut colour.
Heavy body; otherwise same as B 6 L.

B 6 G .. Common quality leaf in Green colour.
Quality of B 6, except maturity.

CUTTER GRADES (C GROUP).

General Specifications.—All grades of the C group must be clean, sound, thin to medium body, must have an open weave, and small to medium size fibres, and must not exceed the tolerance specified with respect to injury and lugs.

U S Grade — Grade Description, Specification, and Tolerance.

C 1 L .. Choice quality cutters in Lemon colour.
Very silky, fine texture, oily, thoroughly ripe, firm, thin body, fairly strong, spready, light colour shade, bright finish, blending fibres, uniform. Tolerance: 5 per cent. injury.

C 1 F .. Choice quality cutters in Orange colour.
Fairly thin to medium body; otherwise same as C 1 L.

C 2 L .. Fine quality cutters in Lemon colour.
Silky, very good texture, oily, thoroughly ripe, firm, thin body, fairly strong, fairly spready, light colour shade, very clear finish, blending fibres, fairly uniform. Tolerance: 10 per cent. injury.

C 2 F .. Fine quality cutters in Orange colour.
Fairly thin to medium body; otherwise same as C 2 L.

C 3 L .. Good quality cutters in Lemon colour.
Very smooth, good texture, fairly oily, ripe, fairly firm, thin body, normal strength, normal width, fairly light colour shade, clear finish, emerging fibres, harmonising. Tolerance: 15 per cent. injury and 10 per cent. lugs of the quality of X 2 or better.

C 3 F .. Good quality cutters in Orange colour.
Fairly thin to medium body; otherwise same as C 3 L.

C 4 L .. Fair quality cutters in Lemon colour.
Smooth, fair texture, lean, ripe, thin body, normal strength, normal width, true colour shade, normal finish, unmingled. Tolerance: 20 per cent. injury and 20 per cent. lugs of the quality of X 2 or better.

C 4 F .. Fair quality cutters in Orange colour.
Fairly thin to medium body; otherwise same as C 4 L.

C 5 L .. Low quality cutters in Lemon colour.
Fairly smooth, lean, fairly ripe, thin body, not tender, normal width, fairly true colour shade, normal to dull finish, unmixed. Tolerance: 20 per cent. injury and 30 per cent. lugs of a quality of X 3 or better.

C 5 F .. Low quality cutters in Orange colour.
Fairly thin to medium body; otherwise same as C 5 L.

LUG GRADES (X GROUP).

General Specifications.—All grades of the X group must be clean, sound, and must not exceed the tolerance specified with respect to dead and trashy leaves.

U S Grade — Grade Description, Specification, and Tolerance.

X 1 L .. Choice quality cutting lugs in Lemon colour.
Smooth, fairly oily, thoroughly ripe, thin to medium body, grainy, very open weave, true colour shade, fairly clear finish, fairly uniform. Tolerance: 5 per cent. of dead and trashy leaves.

X 1 F .. Choice quality cutting lugs in Orange colour.
Medium body; otherwise same as X 1 L.

X 1 R .. Choice quality leafy lugs in Red or Mahogany colour.
Oily, medium to heavy body; otherwise same as X 1 L.

X 2 L .. Fine quality cutting lugs in Lemon colour.
Fairly smooth, thoroughly ripe, thin to medium body, fairly grainy, open weave, fairly true colour shade, normal finish, unmingled. Tolerance: 10 per cent. of dead and trashy leaves.

X 2 F .. Fine quality cutting lugs in Orange colour.
Medium body; otherwise same as X 2 L.

X 2 R .. Fine quality leafy lugs in Red or Mahogany colour.
Oily, medium to heavy body; otherwise same as X 2 L.

X 3 L .. Good quality cutting or granulating lugs in Lemon colour.
Unrough, ripe, thin to medium body, fairly grainy, fairly open weave, fairly dusky colour shade, dull finish, unmixed. Tolerance: 20 per cent. of dead and trashy leaves.

X 3 F .. Good quality cutting or granulating lugs in Orange colour.
Medium body; otherwise same X 3 L.

X 3 R .. Good quality leafy lugs in Red or Mahogany colour.
Fairly oily, medium to heavy body; otherwise same as X 3 L.

X 3 G .. Good quality lugs in Green colour.
Quality of X 3, except maturity.

X 4 L .. Fair quality granulating lugs in Lemon colour.
Fairly ripe, thin to medium body, dusky colour shade, cloudy finish. Tolerance: 40 per cent. dead and trashy leaves.

X 4 F .. Fair quality granulating lugs in Orange colour.
Medium body; otherwise same as X 4 L.

X 4 R .. Fair quality leafy lugs in Red or Mahogany colour.
Medium to heavy body; otherwise same as X 4 L.

X 4 G .. Fair quality granulating lugs in Green colour.
Quality of X 4, except maturity.

X 5 L .. Common quality granulating lugs in Lemon colour.
Thin to medium body, dark colour shade, dingy finish. Tolerance: 60 per cent. dead and trashy leaves.

X 5 F .. Common quality granulating lugs in Orange colour.
Medium body; otherwise same as X 5 L.

X 5 R .. Common quality leafy lugs in Red or Mahogany colour.
Medium to heavy body; otherwise same as X 5 L.

X 5 G .. Common quality lugs in Green colour.
Quality of X 5, except maturity.

NONDESCRIPT AND SCRAP (N. AND S. GROUPS).

N. *Nondescript*, as defined.

S. *Scrap* as defined.

A careful study of the specifications of the United States standard grades for flue-cured tobacco is calculated to prove most informative to the Queensland grower, as will also the elements of quality involved therein.

It will be noted in each case colour deepens with increase of body; also, the quality of such colour in the degree of finish is influenced by departure from full ripeness and the efficiency of harvest, cure, and bulking.

Throughout this article the necessity for full ripeness at harvest is stressed. Attention is also drawn to the depreciation of the product that is liable to occur from careless handling (bruising and breakage) in the various stages from picking to arrival on the selling floor, as well as to faults in curing.

It should be understood the grade marks in America are not placed on the tobacco by the grower, but by the officials of the United States grading service after careful examination of the lots prior to their offer for sale, usually by auction.

Should a standard of grades be adopted for Queensland or Australia the marking of such grades would no doubt be effected by a grading service similar to that of the United States of America.

Home Grading.

Whether a standard of grades was adopted or not, the grading of leaf on the farm would be necessary for economic production. At all times the grading of leaf on the farm has been advocated by the Queensland Department of Agriculture, since not only does it result in a lessened cost of production but tends to improve the growers' knowledge

of leaf quality and indicate directions for improvement. Those growers who have classified their leaf and marketed it direct have found it decidedly profitable and in most instances have received approval from buyers. Many have stated their average price for home graded was appreciably in advance of that received when the leaf was sent to a proprietary grading concern, and that the amount of scrap or damaged leaf was much less.

A deterrent to home grading in most instances is lack of confidence on the growers' part and the idea that the time occupied therein cannot be spared from other farm operations. By adopting a system in bulking down after each cure, grading will be much simplified and the time occupied therein greatly lessened.

As remarked previously, leaves ordinarily increase in body from the bottom to the middle of the plant, and decrease from there to the top. When the stand of plants is even in growth to maturity each picking will be of leaves occupying practically the same position on the respective plants. They will thus be of more or less even size and texture, differing slightly in quality and colour. In other words they will agree with one or other group.

It has been recommended to bulk down each cure on the sticks on removal from the curing barn (*see* under "Conditioning" in "Tobacco Growing in Queensland"). This will, of course, necessitate a double lot of sticks to allow of the barn being immediately filled again. On the sticks the leaf will come into more even condition, and allow greater ease of handling. During the following cure ample time will be available to take the leaf from the sticks and to roughly grade it into, say, three grades, such as Bright, Medium Bright, and Green (if any). At the same time leaf of another group which on some plants may have been ripe at the time could be separated and added to its proper bulk. Bulks can thus be built up representing the respective pickings from all the plants in the crop. Each would then very largely conform to one of the groups as Lugs, Wrappers, Leaf, or Cutters.

When attention was given to grading for market each bulk would yield leaf in which size, body, texture, and quality as well as colour would be fairly uniform. The number of grades from a bulk would therefore be confined to three or four, or at most five, according to colour and injury rather than to difference in group or quality. Where, as is frequently the case, pickings from all parts of the plants are included in one or two bulks difficulty is experienced, as leaves differing in body, size, quality, and colour are encountered, necessitating upward of a dozen receptacles for the different grades. It is obvious that the leaf in systematic bulking will be graded with much greater speed and accuracy.

It must not be supposed that leaf of each group will be found in quantity in every crop. Soils and seasons, as well as the cultural methods employed, influence quality in tobacco.

Any standard of grades must necessarily provide a large number to allow accurate classification of leaf from crops grown on light to heavy soils and in favourable to unfavourable seasons.

The number of grades to be found in any one crop will be comparatively few in any season, though their quality will be accordingly varied.

In home grading, where the soil on which the crop is grown is fairly uniform, the average pick of three ripe leaves will conform to the requirements of one or other of the grades mentioned, when size of leaf and amount of body are considered.

Colour.—It will be noted in the instructions for grading in "Tobacco Growing in Queensland" that colours are described as Lemon, Bright Mahogany, Mahogany, Dark, and Green. In the American standard Orange is used in place of Bright Mahogany.

At the present time when leaf is offered for sale either on the farm or on an auctioneer's selling floor, buyers insist that it shall be graded into hands and packed ready for transport. The packages are opened and two or more hands extracted. The quality of these hands on examination decides the offer.

As the package bears the grower's name and district as well as its weight and a distinguishing number, it is identifiable at the factory with the buyer's returns. When unpacked there for reconditioning or manufacture the accuracy of grading and the agreement or otherwise of quality of sample to bulk is noted. Such information is no doubt passed on to the buyer who is accordingly guided in his offers of purchase on the next occasion. The grower will thus become known as dependable or otherwise in his grading. A reputation for care in grading can be calculated to influence a possible improvement in offers of purchase just as one for carelessness would suggest a decline.

As mentioned previously, where the soil of the tobacco field is more or less uniform the grading of leaf therefrom will not present much difficulty, especially when systematically bulked.

Size of leaf, body, and texture will largely agree in each bulk, allowing attention to be mainly directed to assortment according to colour, blemish, and injury.

The accidental inclusion in the bulk of leaf of another group will be at once seen, while a definite change of body will be noticed when handling. Such leaves will be few in number and can be set aside for later attention. Leaves with broken stems or midrib should not be included with whole leaf but classed as scrap. As labour during manufacture is increased in the operation of stemming, their inclusion will invariably result in the lowering of offers of purchase.

A well lighted room is absolutely necessary to permit of satisfactory grading as well as a good sense of colour on the part of the assorter.

The atmosphere in this room should carry a degree of humidity sufficient to disallow the drying of leaf during grading and handing. A dry atmosphere, such as obtains when westerly winds prevail, can be corrected by damping the floor or suspending wet bags in positions where contact with the tobacco is not possible.

When the leaf in the bulk is so dry that it cannot be properly examined without danger of breakage it will be necessary to bring it into sufficient condition to permit of ready handling.

A room in which humidity can be controlled fitted with racks to carry shallow trays with wire-netted bottoms to hold leaf so that the humidified air will readily circulate through it, is of great advantage in so doing. By a gradual absorption of moisture in this manner a satisfactory condition is most easily secured.

A more expeditious though less attractive method is to admit steam at a very low pressure to the bottom of a box or similar receptacle at least 2 feet in height, the bottom, sides, and ends of which are close-boarded and the top covered with wire-netting. The leaf is placed on this and carefully separated so that contact is made with the vapour arising until it becomes sufficiently limp. Care is necessary with this method to prevent over conditioning by which colour would be depreciated.

Sizing.—The size of a leaf is denoted by its length and breadth. Varieties differ in the relation of one to the other, but not to a remarkable extent in those at present commonly grown in the State for flue-curing. As the leaf grown on the farm will usually be the product of one variety length can be taken to determine size.

In such leaf the qualities of flatness, texture, smoothness, porosity, solidity, body, strength, elasticity, &c., will generally agree with the lengths, except in the case of primings or sand lugs, where departures therefrom are pronounced.

Where more than one variety is grown and there is great disparity in the width of leaves of equal length separate grades are advisable.

Lengths.—Should a standard of grades be adopted for the State is is probable a standard of tobacco sizes therewith would also be determined. Until such, however, has been consummated, the following sizes, with a range of four inches between longest and shortest therein, are suggested:—

Under 8 inches (class as scrap)
8 inches to 12 inches
12 inches to 16 inches
16 inches to 20 inches
20 inches to 24 inches
24 inches to 28 inches
28 inches and over

The lengths given are approximate. A tolerance for leaves slightly under or over the lengths stated will no doubt be permitted. All the sizes are unlikely to be found in any one crop; they will usually be limited to three or four.

Body.—The body or thickness of the leaf discernible when handling will generally agree with the size. When it does not, as with primings or sand lugs, which are very thin, the difference is sufficiently pronounced to allow of easy separation.

Apart from primings a definite change in body according to size of leaf may be due to growth in a distinctly different type of soil from that general in the field, such as a small area where clay comes close to the surface. Leaf from diseased plants or those affected with nematodes will also vary in body as well as in quality.

Where such leaf is in insufficient quantity to form separate lots for market it can be included in the nearest grades, where a certain tolerance will be allowed. Usually, however, such leaf is of inferior quality to the run of the lot, and will find a place in the lower grades.

Colour.—The colour of leaf, when the shade is light or true and the finish bright or clear, is regarded as a special quality in manu-

facture. Otherwise it is an indication of quality as regards maturity and the efficiency of cure.

As body usually agrees with size, in which many of the elements of quality concur, the value of classification according to colour will be realised.

Injury.—The amount should be calculated as the percentage of the leaf thereby depreciated. Breakage of leaf, otherwise uninjured, does not necessarily lower its smoking quality. A slight fracture of the leaf blade without loss can be disregarded. Broken stems, however, are definitely regarded as injury, as they increase the cost of manufacture. Allow 5 per cent. of injury for each break. Injury, otherwise, will be calculated as the approximate percentage of the usable part of the leaf which is lost or depreciated in value through various agencies—see definition of injury or damage.

Grades are suggested showing, respectively, 5 per cent., 10 per cent., 20 per cent., 30 per cent., 40 per cent., and over 40 per cent.

Wholly dead and trashy leaves which cannot be conditioned should be discarded.

[TO BE CONTINUED.]

TO MEND TANKS AND TROUGHS.

Miss Barbara McGovern, of Waterloo, Longreach, supplies this practical hint:—To mend tanks or troughs that have pinholes rusted through, fill a kerosene tin with cold water. Throw in washing soda until the saturation point is exceeded and undissolved soda can be seen lying on the bottom of the tin. Next get a flat vessel, such as an old baking dish, and mix cement with this water until it becomes a thick paste (make only a small quantity of cement at a time, as it sets very quickly). Apply this paste thickly to the holes with a brush, spreading some around them also. Moisten and wring out a piece of strong unbleached calico and press it down on the cement firmly and smoothly, as if sticking paper on a wall. Put another coat of cement paste on this, then apply another strip of calico, and a final coat of cement will finish the job. Two people are needed to make it a success—one to mix the plaster, and one to do the work. The man mixing the cement must keep briskly stirring and mixing the paste, turning it over with a small trowel till all is used. Water should be shut off the tank for twelve hours. The patch will then have set hard and will not crack when the tank expands or peel off when dry. Sheep troughs stand for years after this treatment, and a tank made of flat galvanised iron was successfully treated while full of water. No soda was available on one selection, and waterglass was used to mix the cement, and used while the tank was full of water. During this present drought the scarcity of water is a very serious matter, and all old tanks, carbide drums, or anything that will hold water is called into commission, and a job has to be done in a hurry, with no plumber available. Selectors on the Thompson River are carting water for household and stock use for many miles, and as the water is rapidly disappearing, it has to be stored as much as possoble.

The Pig Farm.

ACCOMMODATION AND EQUIPMENT.

(*Revised.*)

By L. A. DOWNEY, H.D.A., Instructor in Pig Raising.

IN providing accommodation for his pigs, the farmer must consider the health and comfort of his stock and plan to prevent disease as far as practicable; he must also consider his system of feeding and management and bear in mind the class of pigs that is required by the pork and bacon trades.

During recent years the general demand has changed towards leaner meat, and pig-raisers are now endeavouring to produce pork and bacon pigs which have an abundance of lean meat and a minimum of fat; this, of course, necessitates a change of methods in breeding, feeding, and management.

Investigations into disease in pigs have shown that certain rules in sanitation regarding pig accommodation will, if carried out, control most of the serious troubles which occur in pigs, particularly infestation by internal parasites.

PLATE 188.

Berkshire sows being kept economically on lucerne. Their movable shelter shed may be seen in the background.

Although certain features must be considered for the pig's health and comfort, one must also consider the cost of providing pig accommodation, for pig-raising is a business, and if too much capital is expended on the insurance of health of the stock, the additional income may not give sufficient return on the capital invested. Fortunately, under the mild climatic conditions which prevail in Queensland, ample accommodation may be provided for pigs at a comparatively low cost and the outlay on good piggery equipment is usually well repaid.

The class of accommodation required for any piggery depends upon the system of pig-raising to be carried out. There are several fairly well-defined systems in Queensland. The coastal dairy farmer who keeps pigs to utilise separated milk usually has very little cultivation and rarely grows grain, depending on the separated milk, perhaps some sweet

potatoes and arrowroot, together with some pasture, to feed his pigs. Under these conditions the pigs are usually kept fairly convenient to the dairy to reduce the labour required in conveying milk to the pigs, and, if practicable, the pigs are fed at a place lower than the dairy, the milk being conveyed from the separator room to the piggery by means of an open gutter pipe. On this class of farm pigs are usually given access to grazing on permanent pastures.

The mixed farmer who combines dairying with crop-growing keeps pigs to use his milk by-products and a portion of his grain, root crops, lucerne, and pumpkins. He studies the market prices of pigs and of the various crops to determine when to market his crops direct and when to sell them by way of the pigs. Under these conditions more pigs are kept per cow than where milk is the main source of food supply. The pig accommodation on this type of farm should be such that the pigs can be turned on to portions of the cultivation land to enable them to harvest some of their own food when desired.

Pig-raisers who do not use milk, but substitute meat meal in the pig's ration and grow grain, lucerne, and other crops especially for pigs, have a different proposition again and should aim at having all their paddocks suitable for holding pigs.

PLATE 189.
These prime baconers were "finished" under paddock conditions, never having been penned.

Pig farmers who run large numbers of pigs on small areas of land adjacent to cities or towns or near dairy factories, and feed their pigs on table refuse or factory by-products, usually keep their pigs on a different system to farmers who have fairly large farms and produce most of their pig food.

Bearing in mind the most important feature of pig accommodation —namely, sanitation—there can be only two clearly-defined systems of keeping pigs which are completely satisfactory; one is the grazing system, wherein pigs are kept on fresh pasture or crop land which is

either rested or cultivated and grazed in rotation; the other is the intensive system in which the pigs are kept on impervious floors, such as concrete, which are properly drained and regularly cleansed. In both of these systems the object should be to keep the pigs on clean ground or on a clean floor, for a good deal of the infection to which pigs are subject lurks on the ground or floor of pig pens which are not rested or are inconvenient to cleanse.

Where there is a sufficient area of good grazing land or cultivation land the grazing system has many advantages, and should be adopted either entirely or in combination with the intensive system, which is often convenient for sows with young litters of pigs. If sufficient paddocks can be cropped for the pigs to do the harvesting, the paddocks being ploughed a couple of times each year, infection will be kept at a minimum, the pigs will receive benefit from the exercise gained in grazing or harvesting their own food, a good deal of labour is saved in the harvesting of the crop, and the fertility of the land benefits.

PLATE 190.

Intensive pig pens in use at the Animal Health Station, Yeerongpilly.

On grazing land where cultivation is not practicable it is necessary to have sufficient paddocks of ample area to keep them always well grassed and to enable the resting of the paddocks at frequent intervals. Pig paddocks should not be over-stocked so that they become bare, unless they can be cultivated or rested for several months. Even if pigs are paddocked as suggested, the ground near the troughs will become "pig sick" after a time, and it is most desirable that such equipment should be movable. Sheds of convenient size—say, with a floor space of 8 ft. square—should be provided in the paddocks to shelter the pigs from the extremes of the weather, and these sheds should be built on skids to allow of their easy transport about the paddock or from one

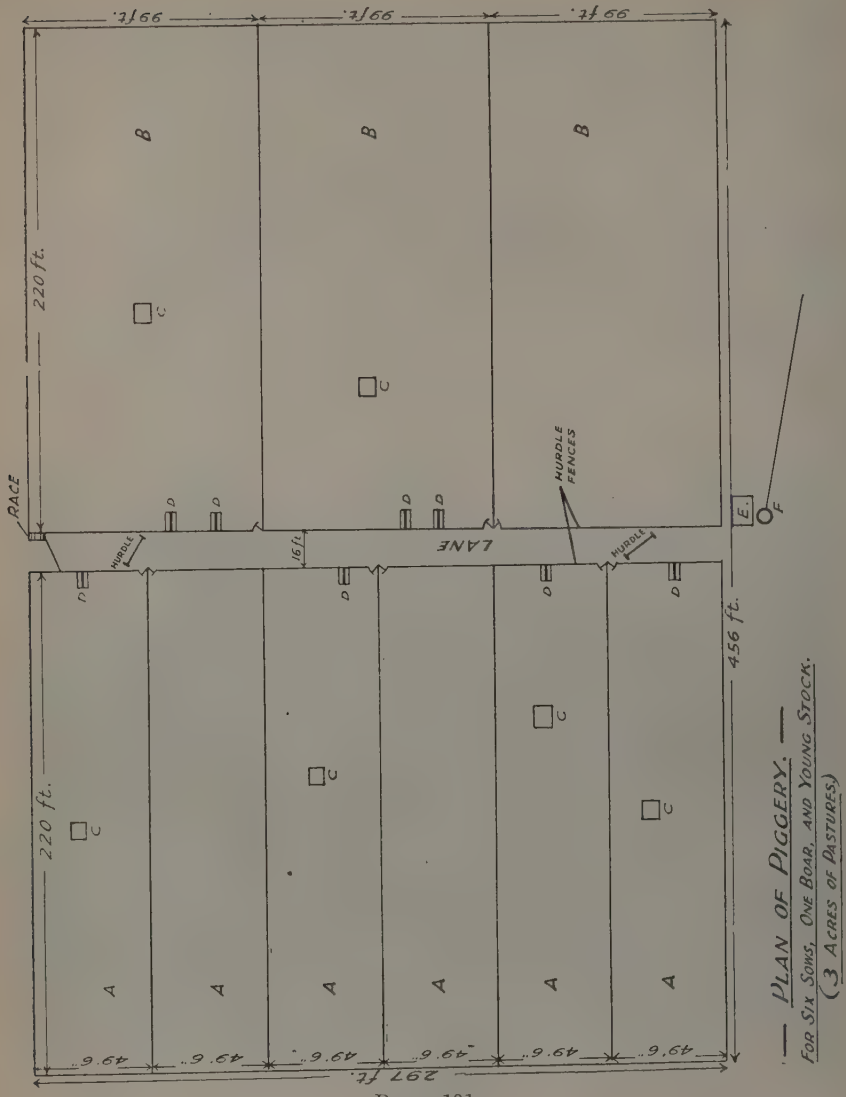


PLATE 191.

(*a*) Indicates paddocks of ¼ acre each for the use of dry sows, sows with litters, and the boar. At most times two of these paddocks could be under cultivation and later be grazed in rotation.

(*b*) Indicates paddocks of ½ acre each in extent to be used for growing pigs. As one paddock could usually be spared they can be cultivated and grazed in rotation.

Six movable sheds (*c*) should be sufficient shelter for the pigs, as these may be moved from one paddock to another as required.

Troughs built on movable platforms (*d*) will be found convenient if drawn against the fence and moved along as the surrounding ground becomes fouled.

(*e*) Shows the feed shed.

(*f*) Shows the milk tank connected by a line of fluming from the separator-room.

paddock to another. Food troughs and platforms, self-feeders, and water fountains should also be mounted on skids for easy transport.

With movable equipment and sufficient paddocks, there is no necessity for cleaning up with broom and shovel, and where pigs are kept on the grazing system the whole piggery is found to be free of noxious odours which are usually associated with small pen piggeries; these features make pig-raising a much more congenial undertaking when the grazing system is adopted.

When the intensive system of pig-raising is adopted, impervious floors and good drains are essential; a good supply of water and labour is also required to clean the pens daily. Intensive pens are necessarily small, and a portion of each pen is roofed to provide the pigs with shelter from the extremes of the weather. (*See* plan of intensive pig pens.)

A Suggested Layout.

The plan of a piggery shown in Plate 191 suggests a layout which has proved very satisfactory where suitable cultivation or grazing land is available. This plan gives scope for cultivation and rotational grazing of paddocks with a view to providing a maximum of pasture for the pigs and control of disease and parasites. The lane in the centre of the runs with a loading race at one end and two movable hurdles provides ample facilities for drafting pigs.

PLATE 192.

A section of a paddock piggery on Mr. W. F. Kajewski's property at Glencoe, showing the laneway, portions of paddocks, and movable shelter sheds. The long narrow paddocks are cropped regularly, and the system has been working satisfactorily for some years.

The usual fencing should be replaced by movable hurdles at the ends of the runs adjoining the lane, so that when paddocks are being cultivated implements may work right to the end of the run, for it is this portion around the troughs which becomes most fouled.

It is not suggested that the pigs will obtain all their food from the 3 acres of grazing shown in the plan, and the grazing can only be

expected to carry the pigs if other food, such as grain and milk or grain and meat meal, are provided in addition.

Where the correct type of pig is bred and feeding conditions are good, pigs may be kept in paddocks as suggested, from birth to slaughter, with excellent results.

On every farm where pigs are bred and reared a certain number of paddocks or pens are necessary so that pigs of various classes and ages may be kept separately. Breeding sows when dry should be run in a separate enclosure to other pigs, and in some cases it is even desirable to run the forward sows separate from the backward sows. Dry sows will secure the greatest part of their food requirement from good grazing and give best results when kept out in the open.

PLATE 193.

This litter of Middle Whites on Mr. H. O. Rees's farm, Maleny, appear to appreciate clean conditions.

The best results are obtained when sows with young litters are kept in individual enclosures, and as it is rather difficult on large piggeries to give each sow and litter a separate paddock large enough to be cultivated, the intensive pen is often resorted to for sows and young litters. However, the sows and litters may be kept separately on pasture by providing each one with a hut to which are affixed three hurdles, making a small run; the whole unit should be movable so that the pigs can be put on to fresh pasture as each patch becomes fouled.

Guard Rail.

All farrowing houses should be fitted with a guard rail to prevent young pigs from being crushed against the walls. Experience has proved that the use of this rail has saved an appreciable percentage of young pigs. This rail can be constructed of 3-in. by 2-in. hardwood, 1-in. water piping, or saplings. It should be placed 9 in. above the floor and 7 in. from the walls.

Individual care is most necessary for sows and litters until the youngsters are about three weeks old, and after that time several sows

with litters of approximately the same age may be run together with good results; however, no other pigs should be run with these. When the pigs are three or four weeks old they may be provided with a self-feeder containing grain or meals; the sows may also be given access to the self-feeder during this latter half of the lactation period, one feeder being sufficient for several sows and litters. When a feeder containing dry foods is provided, there should also be an accessible water supply, even if the pigs are given milk in addition. The young pigs do very well on this system of feeding, and when it is desired to wean them at eight weeks old the self-feeder should be enclosed with hurdles, which enable the young pigs to enter, but exclude the sows. The sow's food supply is so reduced that her milk flow ceases, and at the same time the young pigs take a larger amount of food from the trough, and thus weaning is achieved satisfactorily.

Plate 194.

The system of pasturing sows and litters in movable huts with three hurdles attached to provide a yard is here illustrated in use at Mr. W. Dawson's farm, Woolooga.

After weaning the sows should be returned to the dry sows' paddock and the weaners should be graded into lots according to size.

From weaning time until marketing the growing pigs should be graded according to size into as many lots as convenient; under the grazing system, provided there is ample trough space to feed the pigs comfortably, two or three lots will be sufficient for the growing pigs; under the intensive system, pigs are usually kept in smaller lots.

Situation.

In selecting a site for intensive pig pens, consideration should be given to the aspect so as to provide shelter from the prevailing winds and to make the best use of the early morning sun as a disinfectant and deodoriser inside the sheds; thus a north-easterly aspect will usually be found the most suitable.

It is an advantage to have the pig paddocks on a slope to provide surface drainage. It is required by the Dairy Produce Act that the piggery should be situated at least 150 ft. from dairy yards and buildings.

The available water supply, shade, and proximity to cultivation land are other points to be considered.

PLATE 195.
A half-tank movable shed in use at the St. Lucia Training Farm.

Legislation.

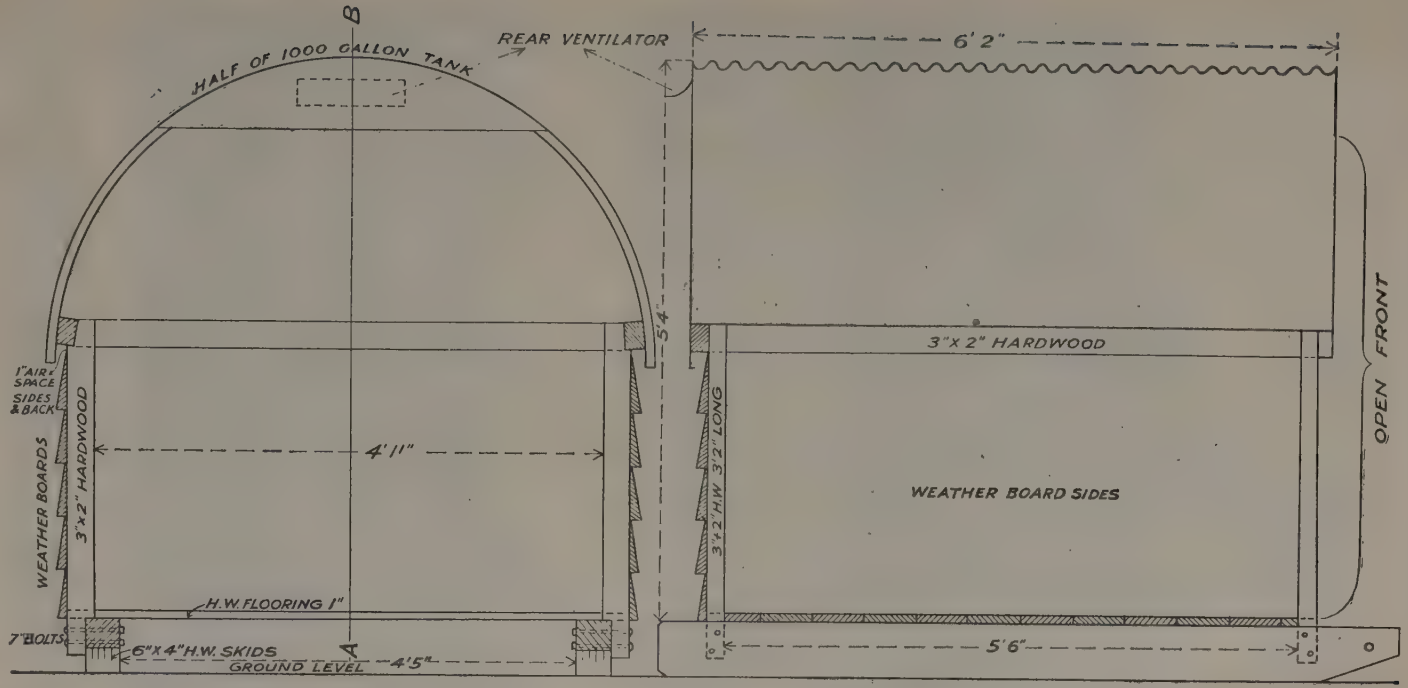
Pig-raising is controlled by legislation under the Pig Industry Act, Dairy Produce Act, Diseases in Stock Act, and the Slaughtering Act, and the by-laws of city, municipal, and shire councils. While it is advisable, when about to construct or alter a piggery to consult the authorities concerned, through the district inspectors under the Acts, it might be stated here that the general purposes of the legislation in force are to provide for health and sanitation on the premises where pigs are kept. They do not aim at hindering progress or at increasing the cost of production.

Quarantine Pen.

It is advisable to provide a quarantine pen some distance from other pens, where newly introduced pigs and sick pigs could be placed and kept under observation. This is an important safeguard against disease.

Troughs.

The piggery should be equipped with troughs of sufficient capacity to feed the pigs without undue scrambling or fighting at feeding time. An average space of 10 in. should be allowed for each adult pig. The trough should have the capacity to hold a full feed for the pigs.



FRONT ELEVATION SECTION THROUGH A.B.

PLATE 196.

Plan of a portable shelter shed, using half a water tank Note skids on which this shed is constructed, providing for ready means of moving the house when required.

PLATE 197.

The fence illustrated consists of "pig netting" of eight horizontals, 30 inches high in all. In addition, a barbed wire has been provided on the ground to prevent rooting, and another 6 inches above the netting to prevent jumping.

PLATE 198.

This fence at the Kairi State Farm has posts 10 feet apart, with four wooden droppers to a panel; seven plain wires run through the posts, and a barbed wire at the bottom prevents pigs rooting below the fence. If it is kept well strained, this type of fence is useful for all but very small pigs, and is cattle-proof.

Pig troughs should be strongly constructed and have a smooth surface free from corners or cracks. Where portable troughs are made, they should be of a size which allows of their being easily carried or hauled on to clean ground. With stationary troughs it is essential that they should be built on to a floor of concrete, brick, or timber to prevent the pigs from making an objectionable mud wallow beside the trough. The most serviceable troughs are of concrete, built into a concrete floor, as shown in Plate 200.

PLATE 199.

Where palings are readily available they can be used for pig fencing, as shown in this illustration.

The V-shaped wooden trough as illustrated in Plate 201 is very useful as a movable trough. This type of trough can be made of varying sizes to suit requirements. The timber must be tightly fitted to prevent leakages. A dressing of tar inside and out acts as a preservative of the wood and also makes it water-tight and more hygienic. Such a trough built on a movable wooden platform is very convenient for paddock use.

Automatic Waterer.

Plate 202 illustrates a watering device used at the Kairi State Farm piggery. A 40-gallon drum is set into a trough 6 in. deep, and the whole is fixed on to a slide. The drum has a $\frac{1}{2}$-in. plug hole $1\frac{1}{2}$ in. from its bottom, and a larger plug hole for filling at its top. The lower hole allows the water to flow out to a sufficient height to allow of the pigs drinking from the trough; and to fill the drum, the bottom hole is plugged and the top hole opened.

Self-feeding of pigs is as yet little practised in Australia, because pigs are kept chiefly to utilise by-products, such as separated milk, which are not readily adaptable to self-feeding; but when the price ratio of grain and pork is such as to make the pig a profitable means of disposing of grain, pig-raising must be considered from a somewhat different viewpoint.

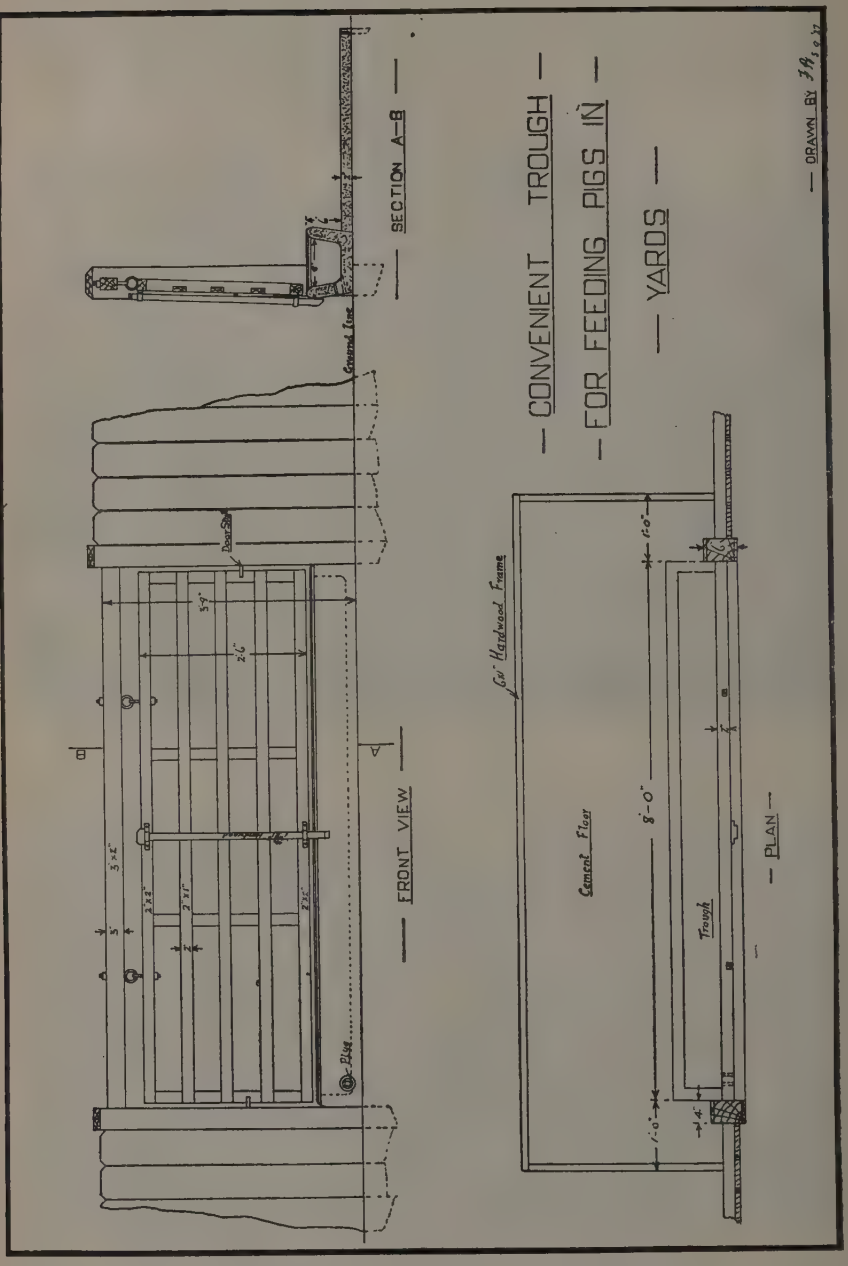

— CONVENIENT TROUGH —
— FOR FEEDING PIGS IN —
— YARDS —
— SECTION A-B —
— FRONT VIEW —
— PLAN —
— DRAWN BY J.A. Lee —
Ground Line
Door Slide
Post
Cor. Hardwood Frame
Cement Floor
Trough
8'-0"
1'-0"
5'-0"
2'-6"
3'x2"
2'x2"
2'x1"
2"x1"

PLATE 200.

PLATE 201.—Handy V-shaped wooden troughs.

PLATE 202.—Automatic water fountain suitable for pigs in paddocks.

Plate 203 illustrates a type of self-feeder which has given satisfactory results in practice.

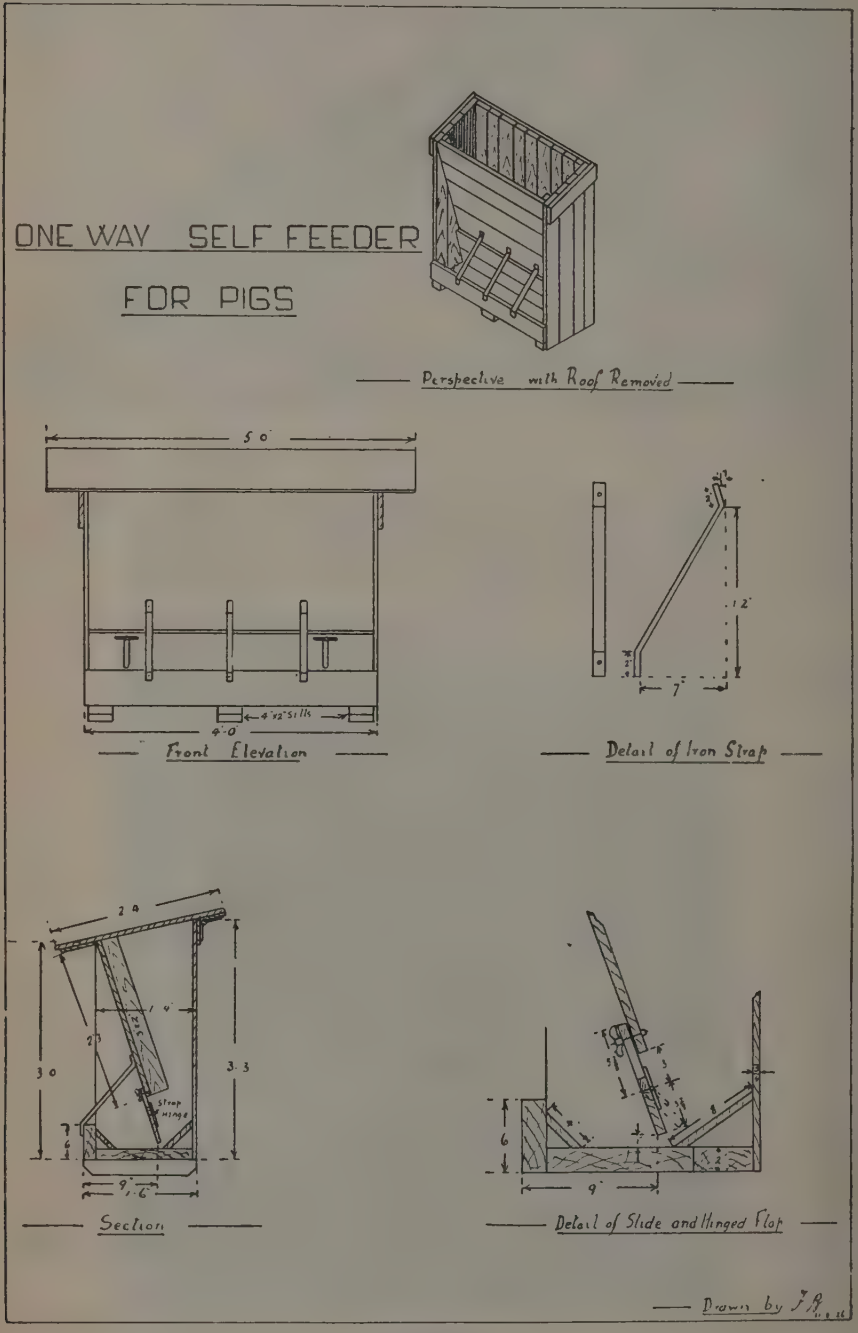


PLATE 203.

PLATE 204.

Baconers grown on the self-feeder, in which was placed a mixture containing 80 lb. maizemeal, 10 lb. lucerne chaff, and 10 lb. meatmeal. The pigs were also given unlimited supplies of drinking water.

PLATE 205.

A useful portable loading race.

The grain-grower who keeps pigs but has no milk foods can make good use of his grain by feeding it in combination with such foods as lucerne chaff and meatmeal, both of which are substitutes for separated milk in the pig's ration. Such feeds as these are adaptable to dry-feeding through a self-feeder, whereby the pigs have several days' food supply placed in the feeder and they are allowed to help themselves. Under certain conditions, self-feeding has many advantages and is worthy of trial.

ONE-WAY SELF-FEEDERS FOR PIGS—MATERIALS REQUIRED.

Members.	Number.	Length.	Size.	Material.
		Ft. In.		
Skids	Three ..	1 6	4 in. x 2 in.	Hardwood
Trough	One ..	4 0	6 in. x 2 in.	Pine
Trough	One ..	3 10½	12 in. x 2 in.	Pine
Trough	One ..	3 10½	4 in. x 2 in.	Pine
Trough	One ..	3 10½	8 in. x ¾ in.	Pine
Trough	One ..	3 10½	4 in. x ¾ in.	Pine
Front Panels	Five ..	3 10½	6 in. x ¾ in. T. & G.	Pine
Front Panels	Two ..	2 3	3 in. x 2 in.	Pine
Sliding and hinged flaps	Two ..	3 10½	4 in. x ¾ in.	Pine
Ends and back	Twenty-four	3 3	6 in. x ¾ in. T. & G.	Pine
Ends and back	One ..	7 0	6 in. x ¾ in.	Pine
Top	Ten ..	2 4	6 in. x ¾ in. T. & G.	Pine
Top	Two ..	5 0	6 in. x ¾ in.	Pine

Hardware—Three 1-inch by ¼-inch iron straps.
Six 3-inch strap hinges.
Two 3-inch by ½-inch bolts with thumb nuts.
Nails, &c.

Shade.

Pigs should be provided with ample cool shade in hot summer months, either by planting shrubs or hedges or by building a framework of 3-in. by 2-in. hardwood and covering the top with bushes or thatching it with grass.

Weighing Pigs.

As pork and bacon pigs are usually sold on a basis of weight and quality, and as the ruling price per lb. varies according to specified weight limits, it is important to the pig-raiser that he should have a fairly accurate knowledge of the weight of his animals before they are offered for sale.

On account of pig-trucking days being two or more weeks apart in some districts, farmers are sometimes forced to market their pigs either too early or too late to have them at the most profitable marketing weights, but in many cases a farmer is able to market his pigs to much better advantage when he is able to weigh them on the farm at regular and frequent intervals prior to trucking.

Even after years of practice, guessing the weights of pigs is not so reliable as weighing them, and where regular consignments of pigs are sent from a farm the use of weighing scales can be recommended, for, with intelligent use, they soon more than defray their cost in the saving of cash effected by marketing pigs at the most profitable weights.

PLATE 206.

A wooden crate suitable for weighing pigs. Note the strong construction, "slide up" doors at both ends, and wires coming from bottom of crate to be attached to hook of the spring balance. Pine should be used in the construction of the crate so that its weight will not be too great.

PLATE 207.

A good feeding outfit in use on Mr. R. Turpin's pig farm, Lowood.

The weighing crate should be light yet strong; a convenient size for a crate to hold one bacon pig is 3 ft. 6 in. long, 2 ft. 6 in. high, and 1 ft. 6 in. wide.

If the weighing crate is arranged in a race, the pigs can be brought from their pen, weighed, and then returned to the pen conveniently.

PLATE 208.
Crate in position, ready for use, with front door closed. Note the arrangement of the top beam, lever, and spring balance.

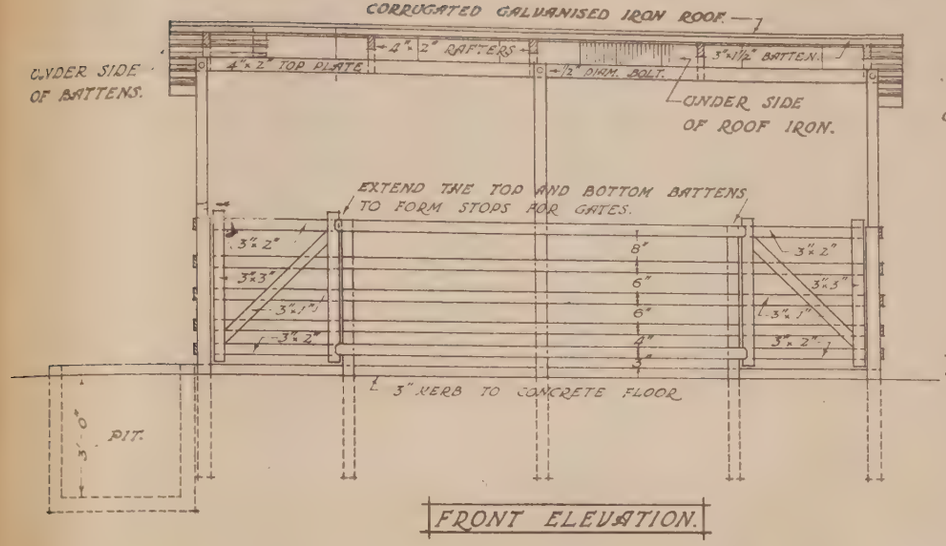
There are many good methods of weighing pigs on the farm, and the most suitable method must be determined according to circumstances, but the suggestions given herein will be helpful to a large number of pig-raisers.

LUCERNE SEED.

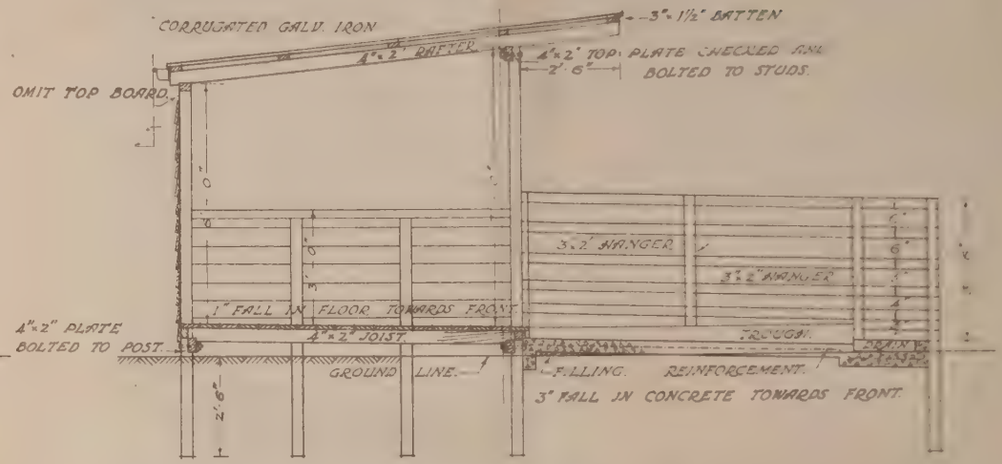
Quantities of lucerne seed that contain a more or less proportion of seeds that are stained red are now upon the Queensland market. This colouring indicates that the bulk in question has been grown outside the Australian Commonwealth.

DEPARTMENT OF AGRICULTURE AND STOCK.
QUEENSLAND.

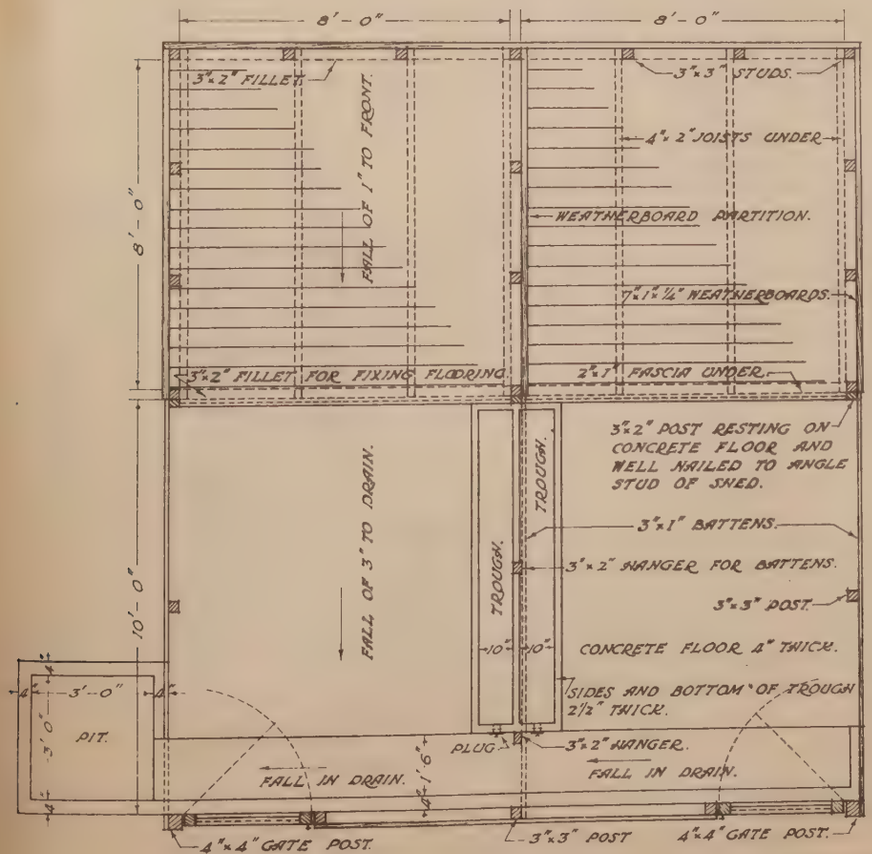
PIG PENS FOR INTENSIVE HOUSING.

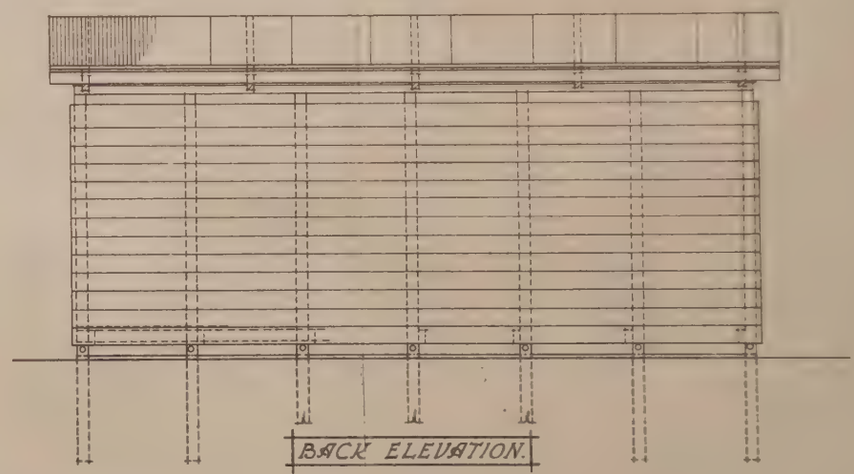


FRONT ELEVATION.

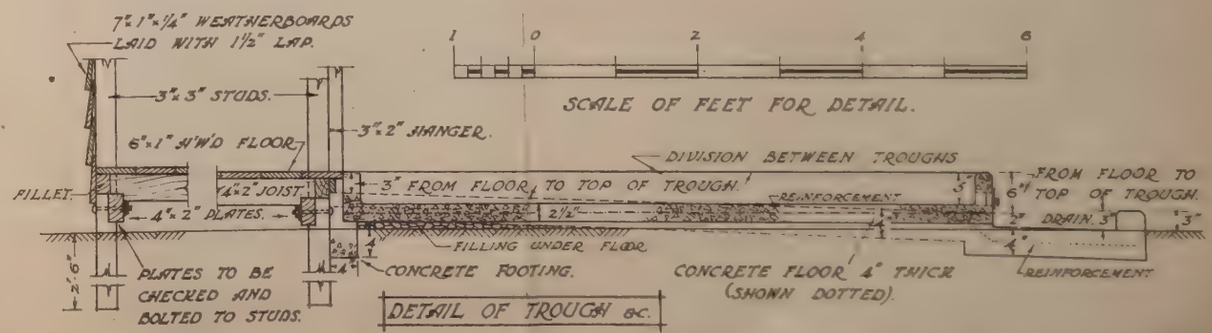


CROSS SECTION.





BACK ELEVATION.



DETAIL OF TROUGH &c.

SCALE OF FEET FOR DETAIL.

PLATE 209.—AN OBJECT LESSON IN PLANT GROWTH.

Members of the Devon Park State School Project Club making observations on crop development in one of their farming plots. Miss M. I. Reeve is the teacher in charge.

PLATE 210.—A TEDIOUS JOB, BUT A LABOUR OF LOVE.

Devon Park Project Club members at work weeding. This new club was formed last August, and the little secretary, Patricia Pearce, writes to say how hard and tedious was the work of digging and preparing the plot for its first crop of pearl millet and saechaline. The presence of nut grass made the job more difficult. A stray horse in search of a juicy bite caused the first big disappointment. Rain came and turned dismay into joy. A fine crop grew to a great height. When ripe for harvest, a flock of parrots raided the seed heads, and so spoiled a good show exhibit. The disappointing experiences proved, however, a spur to bigger effort, and the club has now a winter grass and fodder plot advancing well towards profitable maturity.

Activities of the Wool and Sheep Branch.

FARMERS' WOOL SCHEME.

THE officers of the Wool and Sheep Branch are of the opinion that young graziers are not fully aware of the help available to themselves in the problems arising in connection with their industry. In these notes, therefore, an effort will be made to bring home to those graziers desiring advice the nature of the help awaiting them on application.

The correspondence dealt with continues to increase year by year, and the subjects touched on embrace a variety covering a wide field. We now deal with over 600 regular correspondents, some of whom write throughout the year.

Interviews at Head Office on all subjects dealing with the sheep and wool industry are constant and daily occurrences.

Visits to sheep properties are undertaken on the application of those interested, free of charge, and advice and instruction given when required.

Culling the Ewe Flock.

Considerable work on this important yearly operation has been undertaken during the last few years. It is the object of the officers concerned to teach graziers to do this work themselves, and, above all, to emphasise the necessity of culling regularly as one of the ordinary operations. There is no quicker road to success than in the elimination of the cull and the retention of the better animal and the one, too, suitable to a particular district. It is our desire, also, to see the culls fattened and eventually going into mutton consumption, rather than being passed on to another selector for breeding purposes. With culling should go hand in hand the use of better rams. Work in the selection of rams has gone on apace, and it is gratifying to be able to state that graziers are taking more care in the selection and use of rams. There is probably no greater economy, in the long run, than the expenditure of a few extra pounds on rams, provided the necessary knowledge is available to choose the right type for a particular district. Studmasters have been approached with the object of getting them to type their sale flock rams, so that graziers are enabled to secure the type advocated, and not, as formerly, having to take fine, medium, and strong in the one run.

Woolclassing.

Woolclassing in the sheds is one of our ordinary occupations throughout the year, and here again every effort is made to teach the small grazier to set out his lines correctly. There has been a feeling, whilst prices for the staple have been depressed, that the correct get-up of a clip has been an unpayable proposition. No greater mistake could be made. With the low prices ruling, the necessity arises to get every penny available for the commodity, and this may be brought about by scientific classing.

Experimental Work.

Officers of this branch are from time to time approached by vendors of new specifics proposed to be used in the sheep and wool industry. Whenever possible, these materials are tried out in a practical way in the endeavour, first of all, to protect graziers' sheep from injury, and,

secondly, in the search for something better than the specifics now recommended.

Health of the Flock.

Health of flocks is of paramount interest to officers of the Wool and Sheep Branch, and in this connection our advice is often sought when visiting the various holdings.

Weeds and shrubs believed to be poisonous or detrimental to the health of the sheep are collected on properties where such have been reported. These are submitted to Mr. White, the Government Botanist, and owners advised what course to take for the eradication of the pest.

Advice is constantly being given with regard to blowfly strike in sheep, and practical demonstrations have been carried out with regard to jetting.

Dipping.

Dipping for the eradication of external parasites has been carried out on various holdings. The spread of lice and ticks in South-western Queensland and on the Darling Downs has been rapid during the last few years, and graziers would be well advised to quickly take this matter in hand. If allowed to spread, the loss in both quality and weight of the fleece is extremely serious. The matter of the spread of external parasites in sheep is regarded with grave concern by the Department of Agriculture and Stock, and iti is possible that, at no distant date in the future, steps will be taken to bring under the notice of sheepowners that clause in the Diseases in Stock Act which provides for the compulsory dipping of infested sheep in certain areas and on the stock routes.

Many satisfactory proprietary dips are offering, and owners should carefully follow the directions given as to mixing. One dipping annually with the right material and carried out from one month to two months off shears should be sufficient to eventually free the property from this pest.

General Practice.

Advice with regard to drought feeding has been sought during a portion of the year just passed, and on all occasions information has been supplied having due regard to the economic aspect of the case.

The prescription of sheep licks for different districts and conditions forms one of our activities. In this connection it is well to note that although many good sheep licks are on the market, graziers would be well advised to consult the Department before purchasing. A lick, even if to be recommended for one locality, is not necessarily suitable elsewhere.

The selection of areas suitable and economical for ringbarking purposes has been carried out during the year, and it is certainly a step in the right direction. The selector who makes two blades of grass grow where previously there was only one or none has certainly not lived in vain.

Our advice is freely sought in the matter of improvements. Always with the proviso against over-improvement, instruction is given in such subjects as the erection of shearing sheds, the layout and construction of drafting yards, the economical erection of fences, and the provision of water.

Fat Lamb Raising.

Some considerable time has been spent on the Fat Lamb Scheme inaugurated by the Minister, the Hon. Frank W. Bulcock, last year.

Suitable farmers were supplied with rams of British breeds with the object of demonstrating to those engaged in the industry the best crosses for the purpose. A great deal of interest has been taken in the scheme, and the results achieved, measured by the lambs already forwarded for sale, are bound to have lasting and beneficial results. It is hoped that the scheme may be extended this year, and that some attention will be given to producing the right type of ewe, so necessary to further the production of the right lamb for export.

Farmers' Wool Scheme.

The Farmers' Wool Scheme, carried out by officers of the Wool and Sheep Branch of the Department of Agriculture and Stock, was brought into being twenty years ago, as the result of the recognition of the fact that farmers with small parcels of wool did not receive market value. Bales, bags, and butts are now received under this scheme, and scientifically classed into large lots, when that is possible. When offered for sale under the Department's own brand, the wool consequently meets with the competition of all buyers, and is, in fact, treated in just the same manner as a station clip. The prices received, compared with the average obtained from all wools offered, have been exceedingly good, having regard to the wools we receive for treatment. Farmers and others would be well advised to avail themselves of the benefits to be received under this scheme. Pastoralists and graziers, too, would be well served if they consigned that odd butt or bag which is so often seen in a woolshed. The cash advance of 60 per cent. of the estimated value of the wool, free of interest, should be acceptable to all those who are free to avail themselves of the advantages of the scheme.

The following are the conditions under which wool may be received for classification and sale:—

1. The Minister for Agriculture and Stock is prepared to assist woolgrowers to obtain the best prices for their wool from—

(*a*) Holdings of less than 1,500 merino sheep;

(*b*) Wool from crossbred and British breeds from any holding;

(*c*) Bags and butts from any holding;

(*d*) Star lots from our present selling agents.

The wool will be received for classification and placed on the market to best advantage for sale.

2. A correct account of the wool will be kept, and each woolgrower will be paid the amount received for same, less the necessary broker's and other charges, which are as follows:—

(*a*) A charge of 10s. per bale for classification. (This charge also includes insurance in sheds, on rail, transit to selling broker's stores.)

(*b*) All freight, cartage, handling, broker's charges, bale account, &c.

3. The Department of Agriculture and Stock will charge no commission. An advance of 60 per cent., free of interest, will be made upon the estimated value of the wool as at the time of its receipt in the Department's store. The freedom from interest on the advance will not apply to wool from crossbred and British breeds and bags and butts from holdings of more than 1,500 sheep.

4. The wool will be sold as soon as possible following a sufficient accumulation to enable the wool to be sold to best advantage.

5. The weights as taken in the Departmental store and the classification before sale are to be accepted as final.

6. Woolgrowers desiring to accept this arrangement should notify the Under Secretary, Department of Agriculture and Stock, when consigning the wool, advice of which, with all particulars, should be given.

7. Consign the wool to the Under Secretary, Department of Agriculture and Stock, Roma street.

RECOMMENDATIONS.

(*a*) The bales should be branded with initials and numbers on the top only, so that the same pack, if in good order, may be used again. This saves the price of a new pack to the grower.

(*b*) All merino wool should be kept separate from other grades and breeds.

(*c*) Locks and belly wool should be kept separate.

(*d*) Remove all dags and wet stains before rolling the fleece. The wool requires no other treatment on the farm.

SALE OF WOOL.

The wool will be sold as soon as possible by wool brokers in rotation as arranged by the Department of Agriculture and Stock.

PLATE 211.—FIRST FRUIT OF PROJECT CLUB WORK.
A Saccaline Plot, Devon Park State School, near Oakey.

UNDER average rainfall conditions remain the prominent feature of the present agricultural outlook, although the position has been relieved in the Lockyer Valley and portion of the Darling Downs.

The season has been very unsatisfactory for the establishment of winter grasses and clovers and is now too advanced for obtaining the best results.

CEREAL CROPS.

The Queensland Wheat Board received 3,670,000 bushels from the 1934-35 crop, which figure does not include grain retained by growers for seed and feed purposes. Given favourable weather conditions, an increased area should be sown during the present season. In the Dalby district, particularly at Pirrinuan, new settlers are preparing land, encouraged by the excellent results obtained in the district from the recent crop. Early sown crops are making fair growth but will shortly require further rains. On weed infested areas, a late sowing may not be an unmixed evil, as it will permit of a final late cultivation to destroy weed seedlings.

The intake of grain for the 1934-35 season by the Queensland Barley Board totalled 113,503 bushels, comprising 94,014 bushels of malting barley, 11,201 bushels of cape, and 8,590 bushels of feed. Satisfactory sales were made to Queensland brewers.

PEANUTS.

Heavy deliveries of seeds are being made to the silos at Kingaroy and a record crop is indicated. The Board is optimistic of clearing the crop, estimated at 5,000 tons from 12,500 acres. Sales are expanding and Australia's consumption definitely increasing, so that growers cannot afford to reduce their acreage if the Board is to maintain continuous supplies. The Northern Territory also contributes to Australia's peanut supplies, the present crop being estimated at 400 tons.

TOBACCO.

The opening tobacco sales were held during May, values being maintained at the previous season's level, up to 4s. per pound being paid. The quality of the new season's crop was favourably commented on by buyers. Curing is still in progress, while the late sown crops in the North are still to be harvested.

RECLAIMED PEAR LANDS.

Within the last three years over sixteen million acres of reclaimed pear land have been available for settlement in Queensland. Development is proceeding, the work of fencing, ringbarking and the provision of water being assisted in many instances by advances from the rural development funds.

Of the total area made available over fifteen million acres have actually been taken up.

SOIL EROSION.

With closer settlement and the continuous cropping of our most fertile agricultural areas, a system of permanent agriculture, such as practised in the old world must now receive serious consideration.

The destruction of forests and the subsequent cultivation is now causing decreased fertility which by the depletion of organic matter in the soil renders the land more liable to further loss by erosion and gullying. An enormous area of valuable land has been rendered worthless in U.S.A. by such agencies, and the prevention of further loss is now being tackled in earnest. The same process is now taking place in our own State, more particularly on the coastal lands where hillside farming is the rule. Sheet erosion is also active on even gentle sloping agricultural lands were the soils are incapable of absorbing the storm rains, thus removing valuable plant foods more rapidly than is done by continuous cropping. Fortunately the systematic construction of terraces and broad base contour drains will do much to retard the erosion and eventual ruination of such lands and farmers are urged to immediately take stock of their individual position in this regard. Rotation of crops and the laying down of strips of pasture will also be of assistance in combating loss.

SUGAR.

Present crop estimates indicate a lighter cane tonnage than last year, and a corresponding lower output of sugar—due to an unusually dry summer. The shorter ratoon and plant will, however, be balanced in some districts by heavy cuttings of standover cane.

In most districts seasonal conditions have favoured a satisfactory cane yield. Even in the far North, where the summer was extremely dry, a later improvement in growing conditions benefited crops considerably, although they are still backward for this time of the year. Fortunately, insect pests were not nearly so active or numerous as they are in seasons of normal rainfall, and that fact, added to the absence of flood damage, has evidently provided ground for the optimism that is apparent in present mill estimates of the probable tonnage to be crushed. Good cane tonnages are assured in the Burdekin area.

The Mackay crop, as it stands at present, is, on the whole, giving promise of fair average quality and yield.

From Bundaberg southwards, growing conditions have not been entirely favourable, although the cane left over after the last crushing should insure heavy cane deliveries at most mills.

The official estimate for the coming harvest provides for an anticipated yield of 4,130,000 tons of cane. Allowing 7·1 tons of cane for the manufacture of 1 ton of sugar, the factory output should approximate 581,700 tons of sugar, as compared with an actual production of 611,727 tons last year.

PRODUCTION RECORDING.

List of cows and heifers officially tested by officers of the Department of Agriculture and Stock which have qualified for entry into the Advanced Register of the Herd Book of the Australian Illawarra Shorthorn Society, the Jersey Cattle Society, and the Friesian Cattle Society, production charts for which were compiled for the month of April, 1935 (273 days period unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORNS.				
MATURE (OVER 5 YEARS), STANDARD 350 LB.				
Redberry of Rosehill	W. Flesser, Boyland	15,431·96	560·956	Masher of Oakvale
Blossom II. of Oakvilla (229 days)	H. F. Marquardt, Chelmer	13,330·58	523·81	Victory of Greyleigh
Gold III. of Oakvilla	H. F. Marquardt, Chelmer	12,380·57	495·435	Victory of Greyleigh
Blackland's Choice 4th	A. Pickels, Wondai	10,244·86	444·36	Fussy's Monarch of Hillview
Doris 6th of Hilton	E. O. Althouse, Cloyna	10,285·76	357·764	Warrior 16th of the Cedars
Ruby 3rd of Headlands	E. O. Althouse, Cloyna	8,967·34	351·439	Duchess Jellicoe of Fairfield
JUNIOR, 4 YEARS OLD (UNDER 4½ YEARS), STANDARD 310 LB.				
Rocklyn Jean	T. Strain, Wondai	8,977·17	377·936	King of Sunnyside
SENIOR, 3 YEARS (OVER 3½ YEARS), STANDARD 290 LB.				
Mabel 10th of Sunnyside	Paul Moore, Wooroolin West	9,138·74	371·297	Countess Lad of Cosy Camp
Rosemount Nancy 17th	F. G. Lamkin, Kaimkillenbun	7,740·13	317·761	Bright Star of Cosy Camp
SENIOR, 2 YEARS (OVER 2½ YEARS), STANDARD 250 LB.				
Gentle II. of Alfavale	W. H. Thompson, Nanango	10,940·56	502·575	..
Alfavale Midge	W. H. Thompson, Nanango	11,658·08	425·069	..
Kurrajong Tina	T. Strain, Wondai	8,412·00	388·066	Cosy Camp Newhaven
Marn June 2nd	R. Martin, Biggenden	5,976·6	267·706	Happy Valley Happy Lad
Model 6th of Alfavale	W. H. Thompson, Nanango	8,657·49	399·233	..
Lavender 5th of Blacklands	A. Pickels, Wondai	9,032·98	338·692	Blacklands Major
Rocklyn Melba	T. Strain, Wondai	7,490·5	310·947	Oakvilla Champion Prince

JERSEY.

MATURE (OVER 5 YEARS), STANDARD 350 LB.

Majestic Queen of Brooklands	R. S. Conochie, Sherwood	11,184·65	618·517	His Majesty of Dalebank

JUNIOR, 4 YEARS (UNDER 4½ YEARS), STANDARD 310 LB.

Oxford Sister	M. J. Dunn, Laidley	6,751·7	318·443	Oxford Silvius

SENIOR, 3 YEARS (OVER 3½ YEARS), STANDARD 290 LB.

Overlook Remus Frances	E. Burton & Sons, Wanora	9,130·39	519·969	Plemont Remus

JUNIOR, 3 YEARS (UNDER 3½ YEARS), STANDARD 270 LB.

Brooklands Bronze Plate	R. S. Conochie, Sherwood	10,396·35	517·289	Forward of Brooklands

SENIOR, 2 YEARS (OVER 2½ YEARS), STANDARD 250 LB.

Shamrock IV. of Ryfield	P. Fault, Cushnie, *via* Tingoora	9,017·32	339·284	St. Athans Angus
Cabulcha Butterfly	J. M. Newman, Caboolture	6,001·65	281·47	Grasmere Autocrat

JUNIOR, 2 YEARS (UNDER 2½ YEARS), STANDARD 230 LB.

Brooklands Royal Mabel	R. S. Conochie, Sherwood	8,606·85	456·141	Retford Earl Victor
Brooklands Royal Belle	R. S. Conochie, Sherwood	5,379·6	327·431	Retford Earl Victor
Oxford Buttercup 9th (272 days)	E. Burton & Sons, Wanora	5,196·5	306·07	Oxford Robin
Trinity Fancy Bloom (231 days)	J. Sinnamon & Sons, Moggill	4,942·5	274·702	Some Hope
Daffodil of Woodbine	J. Williams, Wondai	4,593·03	258·217	Trinity Armlet
Trinity Dreaming Bell (231 days)	J. Sinnamon & Son, Moggill	5,149·6	257·111	Trinity Dreaming Pioneer
Cabulcha Butterfly 2nd	J. M. Newman, Caboolture	4,898·8	250·564	Grasmere Autocr t

FRIESIAN.

SENIOR, 3 YEARS (OVER 3½ YEARS), STANDARD 290 LB.

Oaklands Colantha Lady	W. Richters, Tingoora	9,122·55	351·246	Colantha Lad of Oaklands

JUNIOR, 2 YEARS (UNDER 2½ YEARS), STANDARD 230 LB.

Oaklands Winana Rock V.	W. Richters, Tingoora	5,995·73	248·29	Pied Rock

TUBERCLE-FREE HERDS.

The following herds have been declared free from tuberculosis in accordance with the requirements of the scheme of certifying herds tubercle-free :—

Owner.	Address.	Number in Herd.	Expiry Date.
H. H. Dight	Warwick	37	24/10/35
R. A. Slaughter	Clifton	16	31/10/35
Paterson & Paterson	Croxley, Oakey	78	28/11/35
Grimmett & Son	Sherwood	61	1/12/35
Clayton Brothers	Tinana	95	20/2/36
E. H. Heale	Riverdale, Kureen	34	22/2/36
C. Sentinella	Graceville	43	1/3/36
G. T. Fleming	Edge Hill, Cairns	25	16/3/36
D. R. Hutton	Cunningham	42	22/3/36
Mrs. F. Thomason	Highleigh, *via* Cairns	131	28/3/36

ABORTION-FREE HERDS.

The following herds have been declared free of contagious abortion (Bang's disease), in accordance with the requirements of the scheme of certifying herds abortion-free :—

Owner.	Address.	Number in Herd.	Expiry Date.
H. H. Dight	Warwick	37	24/10/35
Grimmett & Son	Sherwood	61	1/12/35
F. P. Allan	Stoneleigh, Oxley	63	1/2/36
Clayton Brothers	Tinana	95	20/2/36
C. Sentinella	Graceville	43	1/3/36

TO NEW SUBSCRIBERS.

New subscribers to the Journal are asked to write their names legibly on their order forms. The best way is to print your surname and full christian names in block letters, so that there shall be no possibility of mistake.

When names are not written plainly it involves much tedious labour and loss of valuable time in checking electoral rolls, directories, and other references. This should be quite unnecessary.

Some new subscribers write their surname only, and this lack of thought leads often to confusion, especially when there are other subscribers of the same surname in the same district.

Everything possible is done to ensure delivery of the Journal, and new subscribers would help us greatly by observing the simple rule suggested, and thus reduce the risk of error in names and postal addresses to a minimum.

THE ROTHAMSTED REPORT.

The appearance of the Rothamsted Report is an annual event of some importance to all interested in the technical advancement of farming. Agricultural advisers, teachers, and students, as well as the growing body of well-informed farmers derive from its pages a considered statement of the results of the past year's experiments on plant nutrition and plant disease. For many readers the conclusions drawn from the experiments will suffice; but for the increasing number of technical readers who are interested in the development of field experimentation there is a section dealing with the design and presentation of the results of experiments and the use of tests of significance. For all the more important experiments and those showing new features of design the plans and individual plot yields are set out in full. Summary tables follow, and the appropriate standard errors are clearly indicated.

The report falls into two sections; one dealing with the field work on fertilizer and cultivation problems at Rothamsted, Woburn, and many outside centres in various parts of England; the other, summarising the laboratory investigations whose details are to be found in the fifty-two scientific papers and twenty-nine technical papers published in 1933.

In recent years uniform schemes of field experiments conducted at a number of centres have largely taken the place of the isolated trial, and in the present report will be found summaries of three series of this kind. One deals with the results of ten years' experiments on malting barley, a second sets out the first year's results of an investigation of the fertilizing value of poultry manure, the third deals with the effect of fertilizers on the yield and quality of sugar beet. A useful review of ten years' fertilizer experiments on potatoes has been included, and a condensed summary of the main findings of fifty years' work at the Woburn Experimental Farm.

Turning now to the laboratory work, full abstracts of all scientific papers are provided, but mention should be made of several lines of work whose bearing on current problems is direct and immediate.

On the chemical side a comprehensive study is being made of the determination of manurial requirements of field soils by means of laboratory tests, using the now extensive body of accredited fertilizery experiments built up in recent years. A study of cultivation problems in the field is being made by the staff of the Physical Department, an aspect in agriculture that becomes increasingly important as farm mechanisation proceeds. Two aspects of the question in particular are receiving attention. Rotary cultivation, being fundamentally different in its action from the traditional methods, is being studied in relation to the nature of the tilth produced and its effect on the germination and growth of the crop. Contrary to the common idea the tilth produced by rotary cultivation differs from an ordinary seed-bed, not so much in its fineness, but rather in its openness or fluffiness, as direct measurements in the field have shown. Another important series of experiments test intensive against normal cultivations, the latter being just sufficient to keep down weeds. Up to the present no definite benefit has resulted from the extra stirring of the soil. This point is important, and is being followed up.

The study of the purification of effluent waters for agricultural industries, successfully undertaken by the Microbiological and Fermentation Departments in the case of beet sugar factory effluents, has now been extended to the more difficult problems of milk factory effluents. Work on virus diseases continues, and a detailed investigation of the causes in the fluctuation of insect populations is now in progress. Problems of bee management have been studed at Rothamsted for some years. At the request and with the active support of practical beekeepers this work has been extended to include the investigation of bee diseases, and a start has been made on the serious and obscure brood diseases of which the European and American Foul Brood are the most important. In the Insecticide Department important studies on pyrethrum and other vegetable poisons are reported. The crops themselves can be produced in the tropical and temperate parts of the Empire.

The report contains a valuable section dealing with the contributions of Rothamsted to the development of the science of statistics written by Professor R. A. Fisher, formerly head of the Statistical Department. This work has had a profound influence on the design and interpretation of biological experiments and the field arrangements developed are in use all over the world. In 1933 a beginning was made in the study of the technique of feeding experiments. An account is given of an experiment on pig management designed to test the possibility of applying to animal experiments the methods that have been so successful in modern field trials. Conclusive results were obtained, showing the necessity of green food for the growing pig and the advantage of wet over dry feeding. The number of pigs run together in a pen had no appreciable effect on their performance.

Answers to Correspondents.

BOTANY.

Fungi.

J.C. (Brisbane)—

It is not possible to say what the particular species a mushroom described by your correspondent is, as several species are found in Australia, and at least three or four of these occur in Queensland. From the description and size, we are inclined to think it is *Panus conchatus*, which emits a white light. Another sometimes found on tank stands, stumps, &c., is *Hiatula Wynniæ*. In place of the usual white or yellowish luminosity, this particular species, which is quite small, gives a bright green light. The luminosity of these fungi, or mushrooms, is not phosphoresence in the true sense. The glowing cannot be produced by heat, nor is it due to the formation of some readily oxidisable compound of phosphorus in the fungus. It is essentially a phenomenon associated with life, and disappears on the death of the organism. Professor D. McAlpine, a recognised authority on Australian fungi, and who has studied the luminous ones in Australia, regards the light produced as a form of energy set free in the process of destructive chemical changes in the living cell.

Misnamed Native Trees.

M.H. (Theodore, Dawson Valley)—

The specimen represents *Pittosporum phillyroides*, a native tree found in all the Australian States, with the exception of Tasmania. We do not think, however, it is anywhere very abundant. It is sometimes called "Native Willow," and we have not heard the name "native orange" applied to it. The latter name we have generally heard given to *Capparis Mitchellii*, the Bumble Tree. The name "Yellowwood" is given to two other trees in Queensland, of which one is a fine timber tree, *Flindersia Oxleyana*, common in coastal and sub-coastal jungles or rain forests; the other, *Terminalia bursarina*, common in the neighbourhood of Emerald, and causes "staggers" or "shivers" in sheep. Your *Pittosporum* is rather a handsome tree, and worth growing on account of its ornamental fruits. The flowers also, though small, are pleasing, and, if we remember rightly, scented rather sweetly. It is somewhat different in appearance from most other members of the *Pittosporum* family.

Plants from Charleville Identified.

H.B. (Charleville)—

(1) *Bassia uniflora;* (2) *Bassia echinopsila;* (3) *Rhagodia parabolica;* (4) *Striplex Muelleri.*

Specimens Nos. 1, 2, 3, and 4 are all members of the Saltbush family. The fodder value of them varies. No. 4 is one of the commonest Saltbushes in many parts of Queensland, and in some districts stock are said to reject it, but in others it is regarded as quite good fodder. Generally stock seem to prefer it when it is dry to when it is green and luxuriant.

5. *Myoporum deserti.*—This plant is allied to the Fuchsia (*Eremophila maculata*), but, unlike that plant, it does not contain a prussic-acid-yielding glucoside. It has, however, been proved definitely by feeding tests to be poisonous to stock, but what the poisonous principle is has not been determined. Acute constipation and intense inflammation of the digestive tract are features of *Myoporum* poisoning. Most of the trouble occurs in travelling stock.

6. *Alstonia constricta,* commonly called "Native Cinchona" or "Quinine Bush." So far as we know, it does not contain any poisonous properties. The bark is sometimes use as a tonic.

Veldt Grass.

J.B. (Jimbour)—

The specimen of *Eriochloa* forwarded by you does not represent Veldt grass. Veldt grass has been tried spasmodically in Queensland, but does not seem to thrive here. Climatic conditions in the southern parts of Western Australia, where Veldt grass thrives, and in Queensland are different. Most Cape plants require a winter rainfall and a dry summer. The *Eriochloa* early spring grass is a native of your district.

Tick Trefoil.

G.H.L. (Gympie)—

The specimen represents *Desmodium triflorum*, a species of Tick Trefoil. The name "Tick Trefoil" refers to the fact that the small pod breaks up into a number of pieces each armed with several hooks or bristles which stick to clothing, the hairs of animals, &c., and thus are carried about. The plant is a legume and quite a valuable forage. The only disadvantage it possesses is that in heavily grazed paddocks it grows rather close to the ground to enable cattle to get much of a bite.

Trees for Charleville District.

A.O. (Charleville).—The following trees listed should do well about Charleville:—

Celtis sinensis, the so-called Portugese elm. We do not remember seeing any of these trees growing about Charleville, but they are well worthy of trial and, we think, would be an acquisition to the district. The leaves make excellent fodder for cattle. They are deciduous for a short time during the winter, but this is of no great consequence, as shade is no great consideration during the winter months. You may have difficulty in obtaining this through the ordinary commercial channels, but we think the Botanic Gardens, Brisbane, could supply.

Melia dubia, White Cedar. This does very well about Charleville, but it is rather subject to borer attack.

Schinus molle, Pepperina Tree or Pepper Tree.

Sterculia rupestris, Bottle Tree.

Sterculia diversifolia, Currajong.

Bauhinia Hookeri, Native Bauhinia or Western Ebony. One of the most beautiful trees that can be grown in the West. It is very slow-growing. We think the Botanic Gardens, Brisbane, has it in stock and could supply.

Phytolacca dioica, the Bella Sombra Tree. We have not seen trees of this growing as far west as Charleville, though we have seen one or two good specimens about Roma. It is a remarkably quick-growing tree, but has rather a swollen, gouty stem. Like the Celtis, the leaves are excellent fodder for stock.

In addition, the following are worthy of trial as possibly growing quite well in your district:—

Flindersia australis, Crow's Ash.

Jacaranda mimosæfolia, Jacaranda.

Ficus spp. Any native Fig such as the Moreton Bay, Port Jackson, &c.

Calodendron capense, Cape Chestnut.

Pinus spp. Any variety of Pine.

Nephelium tomentosum.

Schotia brachypetala. A beautiful red-flowering tree.

You might find some of the trees listed difficult to obtain through the ordinary commercial channels, but we think the Botanic Gardens, Brisbane, could supply them in most cases. The Botanic Gardens, Brisbane, are not under the control of the Government, but under the Brisbane City Council, and we think a charge is usually made of 2s. per tree, plus, of course, carriage. As the planting of some of these unusual trees would be in the nature of an experiment and of educational value, you might, perhaps, approach your own Department or the Brisbane City Council to help you in the matter.

Parramatta Grass.

O.B. (Innisfail)—

The specimen represents *Sporobolus Berteroanus*, sometimes called Parramatta Grass, also Rat's Tail Grass; very common in coastal Queensland; found in old cultivation paddocks, or anywhere where the ground has been disturbed. It is a very tussocky, hard grass, and though stock eat it readily enough in its young stages, they do not care for it so much when old, and on the whole its palatability and nutritive values are rather low. It has caused some concern on parts of the near North Coast between Brisbane and Landsborough, on account of it invading worn patches in paspalum pastures.

Rural Topics.

Wounds in Horses—Simple treatment.

The fundamental principle underlying all wound treatment is to endeavour to provide suitable downward drainage for the discharges from the wound. If such drainage is provided then most wounds tend to heal satisfactorily, but deep wounds penetrating downwards and which form pockets progress unsatisfactorily for the reason that pus and discharges collect within them and cannot get away. Wounds which penetrate in an upward direction need little interference beyond ensuring that they remain open while healing from their deepest part and that they are reasonably clean on the surface. In the case, however, of downward penetrating wounds it is very necessary to judiciously use a knife in order to provide that the discharges can flow freely downwards.

Before any wound treatment is attempted it is desirable that the injured edges of the wound be clipped with scissors to remove the hair and reveal the true nature of the wound. The next step is to wash thoroughly with warm weak disinfectant solution. Then, if necessary, the depth of the wound can be explored with a blunt instrument which has been boiled or with the fingers after the hands have been thoroughly washed and scrubbed. A good and common example of an improperly drained wound is a nail or other puncture of the sole of the hoof. Microbes are carried in when the foot is punctured, pus of a black liquid and foul smelling nature collects in the foot, continues to accumulate because it cannot drain away, and acute lameness follows. If unattended to these corrupt fluids rise slowly above the level of the horn and eventually break out through the soft skin over the coronet; but by this time the structures within the foot are in a nasty mess and the case has become an extremely serious one.

To deal with these hoof punctures the whole foot is cleaned and, if possible, is held in a bucket of warm disinfectant solution to still further clean it and also soften the horn. The sole of the foot is then pared away by making a cone-shaped hole over the point where pain is most acute or it is known that the foot was punctured. The apex of the cone must be carried right through the horn, and when this happens the corrupt fluids will escape and lameness almost immediately disappears. To prevent the hole filling up when treated, &c., a pad soaked in Stockholm tar is placed in position and held by a tin plate interposed between the sole of the foot and a shoe. If attended to thoroughly in the manner described these cases need little further attention beyond dressing once or twice weekly to ensure that the horn is not growing over before all the discharges have got away.

Skeleton Weed.

Numerous inquiries have been received recently at the Department of Agriculture and Stock regarding Skeleton Weed (*Chondrilla juncea*), a native of the Mediterranean Region and Central Europe, now one of the worst weed pests in the Riverina and much of the wheat belt in New South Wales. One shire has already approached the Government with a request that the plant be declared a noxious weed for the whole State. The Government Botanist, Mr. C. T. White, points out that the weed has not yet been found in Queensland, and that like many weeds of the New South Wales and Victorian wheat belts such as St. John's Wort and Stink Wort there is a hope that it may not establish itself here. Even when some of these plants such as blue weed or Paterson's curse do reach Queensland they generally fail to become the serious pests here that they are in the Southern States.

So that farmers, however, may keep a lookout for the weed it may be said that it has a long taproot, a rosette of lobed leaves at the base lying more or less flat on the ground, a branching stem bearing very narrow leaves and numerous yellow flowers of the daisy type. These have in their middle a few seeds which bear several rows of tooth-like prickles towards the top, and are surmounted by a slender stalk with a tuft of hairs at the top. New South Wales authorities state that seedlings are easily destroyed, and it is by pieces of the root and rot-stock carried about on farm implements, &c., that the plant is usually spread. Farmers and others seeing any plant they consider might be Skeleton Weed are advised to send specimens to the Department of Agriculture and Stock for correct identification.

The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staffs of the Queensland Baby Clinics, dealing with the care and general welfare of babies, has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable deaths.

WINTER INFECTIONS.

THERE are a number of infectious diseases which attack the air-passages and throat, and most of them are more common in the cold season. Of them the most frequent are the infectious catarrhs, which we call "colds," and the closely-allied infections called influenzas, which vary from slight illnesses to deadly epidemics. Their attacks confer only a short immunity, varying from a few weeks to perhaps twelve months. With other diseases of this class immunity is very lasting and may continue for the rest of life. Here we include measles, whooping cough, scarlet fever, and diphtheria. In all these diseases, whether slight or severe, complications occur due to secondary invasion of the air-passages, lungs, and ears, not so much by the virus of the original disease as by infective bacteria, which take advantage of the weakened resistance of the patient to cause bronchitis, pneumonia, and abscess of the ears. Except in diphtheria and the malignant forms of influenza, it is these complications which cause the most serious illnesses and deaths. The total mortality is large at all ages, particularly in young children, including infants in their first year.

How We Become Infected.

The living germs of these diseases exist in countless myriads in the secretions of the mouth, throat, and nose of the sufferers, but it is a great mistake to imagine that those who are sick in bed are the main source of danger. Few can be infected by them. The most dangerous are (1) those suffering from mild attacks, who move about freely among other people, (2) those who have recovered, but still have not become free of the disease germs, (3) those who by reason of their high resistance are immune to the disease, but though not sick themselves, carry the germs in their secretions, and so infect other people. These three classes of "carriers" are the chief spreaders of these diseases, and there is no way in which we can certainly avoid them.

The methods by which the germs are usually conveyed from person to person are very simple. The most common is by coughing. Every cough expels great numbers of extremely fine particles, most of them so small as to be invisible. This invisible spray floats in the air as an invisible cloud around the carrier, until the wind blows it away, or until it very slowly settles down. It is easy to understand that any person near him cannot avoid inhaling the germs. The carrier is least dangerous in the open air; most dangerous in rooms with closed doors and windows. That is why these infections are most prevalent in winter. Where a number of people are gathered together in a hall some carriers are almost certain to be present. The danger increases with the degree of crowding and the greater absence of ventilation.

There is another method of spread which is especially frequent among children. We may call it the method of spread by "smearing." Most young children, having been taught no better, put their fingers into their mouths or rub them over their noses. These moist fingers are then applied to their clothes and toys, to the hands and faces of their playmates, and infect everything they touch. This method is very effectual in diphtheria and scarlet fever, which usually do not excite cough, but it applies to all the infections we are considering. Not only are diseases of the throat and air-passages conveyed in this way. The same is true of infectious meningitis, which has caused so many deaths in the past. Many believe that infantile paralysis is similarly spread by carriers.

How Infection may be Prevented.

Some people catch every infection; others seldom fall to them. In other words, we are not all equally susceptible; we have different degrees of resistance. Most susceptible are babies, young children, and people who are poorly nourished, in spite often of a sufficiency of food, and sometimes from over-indulgence in certain foods. Our milk-starved children are among those who suffer most. We must endeavour to build up resistance, and for this a good diet rich in vitamins is most valuable.

Resistance is a matter of degree. The poorly resistant may be infected by a small number of germs, which would not injure the more resistant, but might even increase their resistance. Yet the more resistant may be overcome by breathing in large numbers. As we cannot avoid these germs altogether, it is important to avoid taking in a large overwhelming dose of them. Fresh air and open windows are a safeguard; closed rooms and crowded halls are dangerous. Those who cough recklessly should be avoided; and children should be taught better habits. More particularly babies and young children should not be taken to picture shows and evening entertainments. School children must, of course, run some risk, but large classrooms and good ventilation without over-crowding would lessen these risks. Against diphtheria we are, fortunately, able to immunise them by preventive injections.

MATERNITY AND INFANT WELFARE.

The following paragraphs give point to the appeal for public assistance to the King's Jubilee Fund:—

Proper training of doctors, nurses, and midwives in maternal and infant welfare is essential. The King's Jubilee Fund for preserving the lives of mothers and children aims to secure this result. Your contributions and co-operation are needed.

A vital need is the establishment of ante-natal and post-natal services for mothers in city and country. Upon the welfare of mother and child depends the strength of the Australian race. Therefore, support the King's Jubilee Fund, whose proceeds will be devoted to maternal and infant welfare.

How many of the general public realise that one mother in every two hundred pays the supreme penalty for maternity? There may be features which qualify these statistics, but when one recognises that in some hospitals there are no deaths at all, it is obvious that reform is possible. Therefore contribute and work for the King's Jubilee Fund to advance the cause of motherhood.

The Jubilee Fund to assist maternal and infant welfare takes the form of a gift to the King and Queen to celebrate the first twenty-five years of their reign. There is an obligation on every son and daughter to contribute.

Queen Mary is something more than the British Queen; she is a mother. Australians know three of her sons by personal contact—the Prince of Wales, the Duke of York, and the Duke of Gloucester. Two others we know by repute—the Duke of Kent and Princess Mary. The Jubilee Fund for Maternal and Infant Welfare is a tribute to the motherhood of the Queen. Pay your tribute to her by supporting the Jubilee Fund!

The British Empire depends upon healthy mothers and healthy children. By contributing your mite to the Jubilee Fund you will contribute to the might of the British Commonwealth of Nations.

£50,000 has been contributed by the Commonwealth Government to establish a Maternal and Infant Welfare Fund for Australian women and children as a jubilee gift to the King and Queen. The general public is asked to supplement the £50,000 so that some worth-while memorial may be established. Every penny will help.

The establishment of a healthy race, fit to overcome the great problems associated with the development of Australia, begins in the maternity service. Every citizen should contribute to the Jubilee Fund.

IN THE FARM KITCHEN.

MEAT COOKERY.

WAYS OF COOKING MEAT.

(*a*) Broiling or pan-frying.

(*b*) Baking or roasting.

(*c*) Boiling.

(*d*) Pot roasting, braising, encasseroling, stewing.

In general, for (*a*) we use steaks, chops, and minced meat; for (*b*) ribs, round, rump; for (*c*) corned beef, shank end, neck, thin flank, brisket, and thin ribs; for (*d*) shoulder, thin ribs, flank, and brisket.

Meat is one of the protein foods, which means that it needs cooking at a low temperature after the outside surface has been sealed to keep in the juices and flavour. If meat is cooked at a high temperature for the necessary time, we find it has become tough and difficult to digest. This will explain why sometimes babies are given *raw* beef juices—the cooked meat could not be digested at all by them, although it is quite safe to give them the juices.

For tender cuts of meat, it is unnecessary to have long, slow cooking, which accounts for the fact that we usually cook these cuts by frying, broiling, or baking.

Long, slow cooking, after the outer surface has been sealed, will make tough cuts tender enough to be palatable, and these tough cuts are generally much cheaper than the better-known and much-sought-after expensive cuts.

The exceptions to this rule for cooking meats are the cured and "soup meats," which are started in cold water, as the object in the case of soup meat is to draw out as much flavour and nutriment as possible, instead of sealing them up inside; and the flavour of the cured meats is too strong unless they are started in cold water.

It is well known that meat is an expensive item in the household budget, and housewives could get the same amount of nourishment at a lesser cost if they knew more about the uses of the different cuts of beef, lamb, and pork. The expensive cuts average about one quarter of total dressed weight, and this, coupled with their popularity, means higher prices.

Another point is that housewives fail to take advantage of the seasonable meats or cuts which may be plentiful.

The "fancy" meats—liver, heart, &c.—are usually very inexpensive, and they give high food value for the outlay, as they are rich in mineral matter, especially iron, which is so necessary for enriching the blood.

TIME-TABLE FOR COOKING MEAT.

Lamb.—This should be cooked, so that when cut, the meat is slightly tinged with pink.

Leg, roasted: 15 minutes per lb.

Chops, broiled: 8-10 minutes per lb.

Shoulder chops: 10-12 minutes per lb.

Shoulder, roasted: 15 minutes per lb.

Pork.

Chops: 10-12 minutes per lb.
Loin roast: 20-25 minutes per lb.
Shoulder roast: 30-35 minutes per lb.
Ham, baked: 20-25 minutes per lb.
Ham, boiled: 20-30 minutes per lb.

Beef.

Broiled steaks: 8-10 minutes per lb.

Rib roasts: 10-15 minutes per lb.

Round or rump roast: 12-15 minutes per lb.

Rolled shoulder roast: 15-20 minutes per lb.

Shoulder or short rib (braised): 30-40 minutes per lb.

Shoulder, brisket, or short ribs, pot roasted: 30-35 minutes per lb.

Corned beef, boiled: 25-30 minutes per lb.

FOOD VALUE OF MEAT.

It has already been mentioned that meat is a protein food, which means that it helps to build up body tissue, and certain parts, such as liver, heart, &c., contain certain valuable vitamins and mineral salts.

An excess of meat in the diet, however, leads to various troubles, such as rheumatism and high blood pressure. Once a day is sufficient to serve meat, as there are so many other foods in the same class which can be used to give the body the necessary nourishment. These are cheese, eggs, milk, and beans and peas. Meat, on the whole, is more difficult to digest than many other foods, and therefore should not be given to children under two years old, except occasionally in the form of gravy and juices.

The following are the different beef cuts and uses for each:—

Shin: Soup meat and brawn. This is a very cheap piece.

Silverside: Salt beef and biltong. An economical cut.

Topside: Steak, roast, braised, pot roast, biltong.

Aitch bone: Roast, salt beef.

Rump: Fried, grilled.

Fillet: Fried, grilled.

Sirloin, cuts 1, 2, 3, 4: Roast, first cut is the best, as there is most fillet.

Wing rib: Braised. Roast. An economical cut.

Fore Ribs; sirloin steaks: Rolled and braised.

Middle ribs: Stew or braise. Mince meat. A cheap cut.

Back ribs: Same as foregoing.

Neck: Soup meat. Mince.

Foreshin: Soup meat and brawn. (Cheap.)

Brisket: Braising and pot roast. (Cheap.) Salted and rolled. (Cheap.) Pressed. (Cheap.) Spiced. (Cheap.)

Short ribs: Braising and soup meat. (Cheap.) Rolled and stuffed. (Cheap.)

Thin flank: Rolled and stewed with other meat, as it is a fatty piece. (Cheap.)

Thick flank: Stewing steak. (Cheapest cut.) Pot roast.

Leg: Roast.

Kidney; liver; hearts, &c.: Fried, braised, broiled.

Skirt steak: Stew (preferably with oxtail).

Chuck rib steaks: Stew and mince. (Tender cut.)

Hump: Salted. (Cheap.)

Pork.

Head: Roasted or fried.
Chump end: Roast.
Middle loin: Roast or chops.
Best end: Roast or chops.
Blade bone: Boiled.
Spare rib: Salted, roasted, or fried.
Chops: Salted.
Belly; hand: Salted.
Trotter; hock: Brawn.
Leg: Roast or salted.

Mutton or Lamb.

Shank end or knuckle: Soup meat.
Leg: Roast.
Fillet end: Roast.
Loin: Roast.
Saddle: Roast.
Neck: Roast and stew.
Best end; middle; scrag end; shoulder; Boned, rolled, and stuffed, then pot-roasted or braised.
Breast: Braised. Curry.
French cutlets: Crumbled and fried.

General Rules.

(1) Weigh meat to tell length of time required for cooking, and to see that correct weight is secured.

(2) Remove meat from paper, and keep in a cool place.

(3) Wipe meat with a damp cloth, kept for the purpose. Never wash meat under the tap.

(4) When roasting or pan broiling, always sear the surface of the meat to keep in the juices.

(5) For soups, put meat in cold water, to extract juices.

(6) When boiling meat, put it into boiling water to prevent juices from escaping.

(7) When boiling hams, put on in cold water and boil slowly to extract the salt. Boil about 20 minutes to the pound.

All recipes are on the basis of six servings. c. = cup, T. = tablespoon, t. = teaspoon.

Roast Leg of Mutton and Brown Gravy.

1 leg of mutton (4½ lb.).
1 t. salt.
¼ t. pepper.
½ t. sugar.
1 T. vinegar.
1 onion.
1-2 bay leaves.
Dripping.
About 1 c. water.

(1) Clean thoroughly and trim as desired.

(2) Rub the vinegar, and then the dry ingredients into the meat.

(3) Put the meat in the pan. Pour in the water, add the leaves and onion. If the mutton is lean, put the dripping on the lean parts.

(4) Place in a hot oven, allowing the meat to brown quickly on all sides. (This is called searing.) It will take about ½ hour to brown nicely.

(5) Decrease the heat and allow the meat to cook slowly until done.

N.B.—Time required; 20-25 minutes per lb. plus 20 minutes extra.

If the pan becomes dry, a little more water may be added from time to time.

If the meat is cooked before it is actually time to serve it, cover it with a pan to prevent it from drying out.

BROWN GRAVY.

(1) Pour fat from meat pan, allowing 2 T. fat for each cup of gravy.
(2) Put fat for gravy back into pan and add an equal quantity of flour.
(3) Stir fat and flour over hot fire until well browned.
(4) Add water or stock gradually; 1 c. for 2 T. fat and 2 T. flour.
(5) Season to taste with salt and pepper.

BEEF OLIVES.

1 lb. good steak.	1 oz. suet.
2 oz. breadcrumbs.	½ t. salt.
1 egg.	¼ t. pepper.
1 t. chopped parsley.	A little grated lemon peel.
A grate of nutmeg.	Stock or gravy.

(1) Cut steak thin and divide into 6 pieces.
(2) Dip a rolling pin into cold water, and beat each piece out flat.
(3) Trim nicely.
(4) Cut trimmings up very finely, and add to the breadcrumbs and other ingredients and make into a forcemeat with the egg.
(5) Divide into 6 portions.
(6) Place each portion on a piece of steak, and form into a neat roll. Tie up each end with cotton or a skewer.
(7) Put a little dripping into a pan, and when very hot fry the olives quickly until slightly brown.
(8) Put olives into a cassarole, and pour on just sufficient stock or gravy to cover them.
(9) Simmer gently for 1¼ hours.

N.B.—If the steak is tough, they may simmer longer.

A few minced olives or a bit of pickled walnut is an improvement to the forcemeat.

LAMB TERRAPIN.

2 T. butter.	1 t. dry mustard.
2 T. flour.	1 c. stock.
1 T. Worcester sauce.	½ c. cream or milk.
2 c. diced cold lamb.	2 hard cooked eggs.
Toast.	Parsley.

(1) Melt butter and rub in flour and mustard.
(2) Add cream or milk and stock and Worcester sauce.
(3) Cook well.
(4) Add lamb and hard cooked eggs cut in pieces.
(5) Heat thoroughly before serving.
(6) Garnish with triangles of toast and parsley.

SPANISH STEAK.

A piece of round steak, 4 inches thick.	Salt.
Stock, tomato juice, or gravy.	Chopped onion.
Flour.	Fat.
Pepper.	

(1) Pound steak and pound flour thickly into it.
(2) Rub in pepper, salt, and chopped onion.
(3) Melt fat in pan and brown surfaces of meat well in it.
(4) Surround meat with stock to within 1 inch of top of meat. Tomato juice or gravy may be used.
(5) Simmer 4 hours.

ROAST BEEF AND YORKSHIRE PUDDING.

The best cuts of beef to use for roasting are: Sirloin, ribs, aitch bone, round or part of rump.

Allow 15 minutes for every pound of beef and 15 minutes over.

(1) Wipe meat with damp cloth.

(2) Sprinkle with salt and pepper and dredge well with flour.
(3) Place in roasting pan and dot a few pieces of fat or dripping on top.
(4) Put water into pan around meat, about a quarter of an inch deep.
(5) Cover pan and allow beef to steam thus until the water has boiled away.
(6) Remove cover and roast in the oven in the ordinary way.
(7) Sear surfaces in a very hot oven to prevent escape of juices.
(8) Remove to cooler part of oven until meat is done.

N.B.—Baste the meat every now and then with melted fat to prevent it from drying out.

Yorkshire Pudding.

1 c. milk. ½ t. salt.
1 c. flour. 1 t. baking powder.
2 eggs.

(1) Sift flour, baking powder, and salt together.
(2) Add milk gradually.
(3) Add eggs beaten until very light.
(4) Pour hot beef fat into a pan, or use the pan in which the beef was roasted, after the beef has been removed.
(5) Pour mixture into pan about ½ inch deep.
(6) Place beef on a cake cooler over pan, so that juice may drip on to pudding while it is baking.
(7) Bake 20 minutes in a hot oven.
(8) Cut into squares for serving around roast beef.

Tomato Bredee.

3 lb. ribs of mutton. 2 dozen tomatoes.
3 onions. 2 T. dripping or fat.

(1) Cut mutton into small pieces.
(2) Flour each piece thoroughly, and sprinkle with salt and pepper.
(3) Fry onions in dripping to a light golden brown.
(4) Remove skins from onions.
(5) Add meat and tomatoes to onions.
(6) Stew gently for at least 3 or 4 hours.

N.B.—If tomatoes are very acid, add one or two tablespoons of sugar.

Sheep's Head and Trotters.

To Prepare.

(1) Put into cold water for 1 hour.
(2) Make a mixture of boiling water and lime—4 oz. lime to 2 gallons of water.
(3) Dip head into the boiling solution and scrape clean.
(4) Wash off in clean cold water.
(5) Chop along sides of nostrils through the bone.
(6) Remove eyes and ears, chop through the centre of head.
(7) Remove brain and tongue.
(8) Put trotters into the boiling lime water.
(9) Scrape clean.
(10) Chop between the cleft in the foot to the first joint.
(11) Remove the hard shell over toe.
(12) Place all in a dish of cold water.

To Cook.

1 head. Salt and pepper.
4 trotters. 3 T. vinegar.
4 or 5 onions. 3 cloves.

(1) Put head and trotters into a dish of salt water for 1 hour. 1 T. salt to 1 gallon of water.

(2) Boil slowly in the following mixture for about 8 hours:—
Water enough to completely cover head, &c., onions, pepper, salt, and vinegar.
(3) When done, remove bones from mixture and serve hot.

N.B.—If desired, pour into moulds, and when mixture is set, serve cold.

Roast Stuffed Chicken.

Stuffing.

2 c. stale breadcrumbs.
3 T. butter.
½ t. salt.
1 beaten egg.
½ t. pepper.
1 t. powdered sweet herbs or spiced poultry seasoning.
1 T. chopped parsley.
2 finely chopped raw potatoes.
Enough milk to moisten.

(1) Mix ingredients thoroughly.
(2) Stuff chicken.

Chicken.

1 Fowl about 6 lb.
Pepper and salt.
½ c. water.
1 T. vinegar.
3 T. butter.
Flour.

(1) Place stuffed fowl in pan.
(2) Season with salt and pepper and dredge lightly with flour.
(3) Place butter on fowl.
(4) Put vinegar and water in pan.
(5) Cover pan.
(6) Simmer gently for 1 hour, on the top of the stove.
(7) Remove cover of pan.
(8) Brown quickly. This will take about ½ hour.
(9) Turn fowl occasionally to brown every side.

Gravy.

Make same as gravy for roast leg of mutton.

Crumbed Pork Chops.

6 pork chops.
Salt and pepper.
1 egg.
1½ c. dried bread-crumbs.
¼ c. vinegar.
1 c. flour.

(1) Wipe chops.
(2) Sprinkle with vinegar, and let stand for ½ hour.
(3) Place chops into hot frying pan, and fry for 1 minute on each side.
(4) Roll in flour, dip into beaten egg and roll in bread-crumbs.
(5) Put back into hot fat in pan, and fry slowly for ½ hour.

Boiled Ham.

(1) Weigh the ham.
(2) Scrape and scrub thoroughly with a brush.
(3) Cover with cold water.
(4) Bring slowly to boining point and let boil a few moments.
(5) Skim.
(6) Let boil until tender. (About 20 minutes to each pound.)
(7) When tender, set aside to partially cool in the liquid.
(8) Remove from liquid and draw off the skin.
(9) Brush over with beaten yolk of egg diluted with milk.
(10) Sprinkle with yellow sugar and cracker crumbs, mixed together. (Toasted bread crumbs could take the place of cracker crumbs.)
(11) Stick a few cloves into the ham.
(12) Put in the oven to brown the crumbs.
(13) Cover the bone with a paper frill.

FLOWER GARDEN.

Winter work ought to be in an advanced state. The roses will not want looking after. They should already have been pruned, and now any shoots which have a tendency to grow in wrong directions should be rubbed off. Overhaul the ferneries, and top-dress with a mixture of sandy loam and leaf mould, staking up some plants and thinning out others. Treat all classes of plants in the same manner as the roses where undesirable shoots appear. All such work as trimming lawns, digging beds, pruning, and planting should now be got well in hand. Plant out antirrhinums, pansies, hollyhocks, verbenas, petunias, &c., which were lately sown. Sow zinnias, amaranthus, balsam, chrysanthemum tricolour, marigold, cosmos, cockscombs phloxes, sweet peas, lupins, &c., plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna lily, and other bulbs. Put away dahlia roots in some warm moist spot where they will start gently and be ready for planting out in August and September.

No time is now to be lost, for many kinds of plants need to be planted out early to have the opportunity of rooting and gathering strength in the cool, moist spring-time to prepare them for the trial of heat they must endure later on. Do not put your labour on poor soil. Raise only the best varieties of plants in the garden; it costs no more to raise good varieties than poor ones. Prune closely all the hybrid perpetual roses; and tie up, without pruning, to trellis or stakes the climbing and tea-scented varieties, if not already done. These and other shrubs may still be planted. See where a new tree or shrub can be planted: get these in position; then they will give you abundance of spring bloom. Renovate and make lawns, and plant all kinds of edging. Finish off pruning. Divide the roots of chrysanthemums, perennial phlox, and all other hardy clumps; and cuttings of all the summer bedding plants may be propagated.

Sow first lots, in small quantities, of hardy and half-hardy annuals, biennials, and perennials, some of which are better raised in boxes and transported into the open ground. Many of this class can, however, be successfully raised in the open if the weather is favourable. Antirrhinum, carnation, picotees, dianthus, hollyhock, larkspur pansy, petunia, *phlox Drummondi*, stocks, wallflower, and zinnias, &c., may be sown either in boxes or open beds. Mignonette is best sown where it is intended to remain. Dahlia roots may be taken up and placed in a shady situation out of doors; plant bulbs such as anemones, ranunculus, fresias, snowflakes, ixias, watsonias, iris, narcissus, daffodil, &c. The Queensland climate is not suitable for tulips.

To grow these plants successfully it is only necessary to thoroughly dig the ground over to a depth of not less than 12 inches, and incorporate with it a good dressing of well-decayed manure, which is most effectively done by a second digging; the surface should be raked over smoothly so as to remove all stones and clods, thus reducing it to a fine tilth. The seed can then be sown in lines or patches as desired, the greatest care being taken not to cover deeply; a covering of not more than three times the diameter of larger seeds, and a light sprinkling of fine soil over small seeds, being all that is necessary. A slight mulching of well-decayed manure and a watering with a fine-rosed can will complete the operation. If the weather prove favourable, the young seedlings will usually make their appearance in a week or ten days; thin out so as to leave the plants (if in the border) at least 4 to 6 inches apart.

TO SUBSCRIBERS—IMPORTANT.

Several subscriptions have been received recently under cover of unsigned letters. Obviously, in the circumstances, it is impossible to send the Journal to the subscribers concerned.

It is most important that every subscriber's name and address should be written plainly, preferably in block letters, in order to avoid mistakes in addresses and delay in despatch.

Orchard Notes for July.

THE COASTAL DISTRICTS.

THE marketing of citrus fruits will continue to occupy the attention of growers. The same care in the handling, grading, and packing of the fruit that has been so strongly insisted upon in these monthly notes must be continued if satisfactory returns are to be expected. Despite the advice that has been given over and over again, some growers still fail to grasp the importance of placing their fruit on the market in the best possible condition, and persist in marketing it ungraded; good, blemished, and inferior fruit being met with in the same case. This, to say the least, is very bad business, and as some growers will not take the necessary trouble to grade and pack properly, there is only one thing to do, and that is to insist on the observance of standards of quality and see that the fruit offered for sale complies with the standards prescribed, and that cases are marked accordingly.

Where the crop has been gathered, the trees may be given such winter pruning as may be necessary, such as the removal of broken or diseased limbs or branches, and the pruning of any superfluous wood from the centre of the tree. Where gumming of any kind is seen it should be at once attended to. If at the collar of the tree and attacking the main roots, the earth should be removed from around the trunk and main roots—all diseased wood, bark, and roots should be cut away, and the whole of the exposed parts painted with Bordeaux paste.

When treated, do not fill in the soil around the main roots, but allow them to be exposed to the air for some time, as this tends to check any further gumming. When the gum is on the trunk or main limbs of the tree cut away all diseased bark and wood till a healthy growth is met with, and cover the wounds with Bordeaux paste.

Towards the end of the month all young trees should be carefully examined for the presence of elephant beetles, which, in addition to eating the leaves and young bark, lay their eggs in the fork of the tree. When the young hatch out they eat their way through to the wood and then work between the wood and the bark, eventually ringbarking one or more of the main limbs, or even the trunk. A dressing of strong lime sulphur to the trunk and fork of the tree, if applied before the beetles lay their eggs, will act as a preventive. In the warmer localities a careful watch should also be kept for the first appearance of any sucking bugs, and to destroy any that may be found. If this is done systematically by all growers the damage done by this pest will be very much reduced.

Citrus trees may be planted throughout the month. Take care to see that the work is done in accordance with the instructions given in the June notes. All worn-out trees should be taken out, provided the root system is too far gone to be renovated; but when the root system is still good the top of the tree should be removed till sound, healthy wood is met with, and the portion left should be painted with a strong solution of lime sulphur. If this is done the tree will make a clean, healthy growth in spring.

The inclusion of a wide range of varieties in citrus orchards—and which has been the general practice—is to be deprecated. Even in new plantations there is a tendency to follow the same unprofitable lines. Far too much consideration is given to the vendor's description for the purchaser's appreciation of a particular variety or varieties. Individual tastes must be subordinated to market requirements, and the selection of varieties to the best available kind of early, medium, and late fruits. Amongst oranges Joppa should be placed first, Sabina for early fruit, and Valencia or Loon Giru Gong for late markets.

In mandarins local conditions influence several varieties, and since the introduction of the fungus known as "scab" the inclusion, particularly on volcanic soil, of the Glen Retreat and Emperor types is risky. In alluvial lands, Emperor and Sovereign (an improved Glen Retreat) are the most profitable, though Scarlet in many places is worth including, with King of Siam as a late fruit.

Land intended for bananas and pineapples may be got ready, and existing plantations should be kept in a well-cultivated condition so as to retain moisture in the soil.

Bananas intended for Southern markets may be allowed to become fully developed, but not coloured, as they carry well during the colder months of the year, unless they meet with a very cold spell when passing through the New England district of New South Wales.

The winter crop of smoothleaf pines will commence to ripen towards the end of the month, and when free from blackheart (the result of a cold winter) or from fruitlet core rot, they are good for canning, as they are of firm texture and stand handling. Where there is any danger of frost or even of cold winds, it pays to cover pines and also the bunches of bananas. Bush hay is used for the former and sacking for the latter.

Strawberries should be plentiful during the month, provided the weather is suitable to their development, but if there is an insufficient rainfall, then irrigation is required to produce a crop. Strawberries, like all other fruits, pay well for careful handling, grading, and packing; well-packed boxes always realising a much higher price than indifferently packed ones on the local market.

When custard apples fail to ripen when gathered, try the effect of placing them in the banana-ripening rooms, and they will soon soften instead of turning black.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

JULY is a busy month for the growers of deciduous fruits, as the important work of winter pruning should, if possible, be completed before the end of the month, so as to give plenty of time for spraying and getting the orchard into proper trim before the spring growth starts.

In pruning, follow the advice given in the May number; and if you are not thoroughly conversant with the work, get the advice of one of the Departmental officers stationed in the district.

Pruning is one of the most important orchard operations, as the following and succeeding seasons' crops depend very largely on the manner in which it is carried out. It regulates the growth as well as the number and size of the fruit, as if too much bearing wood is left there is a chance of the tree setting many more fruits than it can properly mature, with a result that unless it is rigorously thinned out it is under-sized and unsaleable. On the other hand, it is not advisable to unduly reduce the quantity of bearing wood, or a small crop of overgrown fruit may be the result.

Apples, pears, and European varieties of plums produce their fruits on spurs that are formed on wood of two years' growth or more; apricots and Japanese plums on new growth and on spurs; but peaches and nectarines always on wood of the previous season's growth. Once peachwood has fruited it will not produce any more from the same season's wood, though it may develop spurs having a new growth or new laterals which will produce fruit.

The pruning of the peaches and nectarines, therefore, necessitates the leaving of sufficient new wood on the tree each season to carry a full crop, as well as the leaving of buds from which to grow new wood for the succeeding year's crop. In other words, one not only prunes for the immediately succeeding crop, but also for that of the following season.

All prunings should be gathered and burnt, as any disease that may be on the wood is thoroughly destroyed. When pruned, the trees are ready for their winter spraying.

All kinds of deciduous trees may be planted during the month provided the ground is in a proper state to plant them. If not, it is better to delay planting until August, and carry out the necessary work in the interval. The preparation of new land for planting may be continued, although it is somewhat late in the season, as new land is always the better for being given a chance to mellow and sweeten before being planted. Do not prune vines yet on the Granite Belt; they can, however, be pruned on the Downs and in the western districts.

Trees of all kinds, including citrus, can also be planted in suitable situations on the Downs and western districts, and the pruning of deciduous trees should be concluded there. If the winter has been very dry, and the soil is badly in need of moisture, all orchards in the western districts, after being pruned and ploughed, should receive a thorough irrigation (where water is available) about the end of the month, so as to provide moisture for the use of the trees when they start growth. Irrigation should be followed by a thorough cultivation of the land to conserve the water so applied. As frequently mentioned in these notes, irrigation and cultivation must go hand in hand if the best results are to be obtained, especially in our hot and dry districts.

Farm Notes for July.

FIELD.—Practically the whole of the work on the land for this month will be confined to the cultivation of winter crops, which should be now making good growth, and to the preparation of land for the large variety of crops which can be sown next month. Early-maturing varieties of wheat may be sown this month. The harvesting of late-sown maize will be nearing completion, and all old stalks should be ploughed in and allowed to rot. Clean up all headlands of weeds and rubbish, and for this purpose nothing equals a good fire. Mangels, swedes, and other root crops should be now well away, and should be ready for thinning out. Frosts, which can be expected almost for a certainty this month, will do much towards ridding the land of insect pests and checking weed growth. Cotton-picking should be now practically finished and the land under preparation for the next crop. The young lucerne should be becoming well established; the first cutting should be made before the plants flower—in fact, as soon as they are strong enough to stand the mowing machine—and the cutting of subsequent crops should be as frequent as the growth and development of the lucerne plants permit. Ordinarily cutting should be regulated to fit in with the early-flowering period—i.e., when about one-third of the plants in the crop are in flower.

PLATE 212.—PROUD OF HIS PLOT.
An example of Project Club work at Devon Park State School, near Oakey.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF APRIL, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1935, AND 1934, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	April.	No. of Years' Records.	April. 1935.	April. 1934.		April.	No. of Years' Records.	April. 1935.	April. 1934.
North Coast.	In.		In.	In.	*Central Highlands.*	In.		In.	In.
Atherton	4·34	34	3·23	6·05	Clermont	1·64	64	..	0·68
Cairns	11·55	53	3·41	13·38	Gindie	1·25	35	..	0·14
Cardwell	8·90	63	4·57	11·16	Springsure ..	1·59	66	..	1·75
Cooktown	8·82	59	2·45	12·86					
Herberton	3·90	49	2·00	4·39					
Ingham	7·74	43	3·99	4·19					
Innisfail	20·30	54	9·47	39·35					
Mossman Mill ..	8·77	21	4·68	4·42	*Darling Downs.*				
Townsville	3·44	64	0.47	1.69					
					Dalby	1·43	65	1·16	3·33
Central Coast.					Emu Vale ..	1·45	39	0·76	3·90
					Hermitage ..	1·46	28	0·68	2·72
Ayr	2·52	48	1·05	1·03	Jimbour	1·42	47	1·32	3·58
Bowen	2·75	64	1·73	0·81	Miles	1·51	50	0·22	2·42
Charters Towers ..	1·53	53	..	1·09	Stanthorpe	1·80	62	1·06	4·69
Mackay	6·31	64	3·17	3·02	Toowoomba ..	2·66	63	3·86	6,28
Proserpine	5·86	32	7·76	4·39	Warwick	1·68	70	1·77	2·36
St. Lawrence ..	2·83	64	0·43	2·05					
South Coast.									
Biggenden	2·26	36	1·31	4·55	*Maranoa.*				
Bundaberg	3·29	52	7·04	11·91					
Brisbane	3·86	84	3.62	6·33	Roma	1·35	61	0·01	0·78
Caboolture	4·66	48	4·23	16·19					
Childers	2·93	40	2·77	6·13					
Crohamhurst ..	6·74	41	4·82	15·90					
Esk	3·12	48	2·22	3·91					
Gayndah	1·49	64	0·74	2·05					
Gympie	3·52	65	4·30	9·07	*State Farms, &c.*				
Kilkivan	2·33	56	2·03	4·94					
Maryborough ..	3·88	64	6·35	10·12	Bungeworgoral ..	1·28	20	0·09	0·72
Nambour	6·41	39	6·12	10·62	Gatton College ..	1·89	35	1·64	4·55
Nanango	2·02	53	1·61	3·67	Kairi	4·11	20	..	8·36
Rockhampton ..	2·61	64	0·75	3·00	Mackay Sugar Experiment Station	4·95	37	2·80	2·57
Woodford	4·80	48	3·99	9·32					

A. S. RICHARDS, Divisional Meteorologist.

CLIMATOLOGICAL TABLE—APRIL, 1935.

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Atmospheric Pressure. Mean at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.				Total.	Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	29·83	85	69	87	10, 19	63	20	245	9
Herberton	..	78	58	84	9, 10	47	19	200	10
Rockhampton	29·97	86	63	94	9	54	15	75	7
Brisbane	30·03	79	59	89	9	49	17	362	14
Darling Downs.									
Dalby	30·01	79	50	89	9	34	17	116	3
Stanthorpe	..	71	43	80	9	23	17	106	7
Toowoomba	..	73	51	83	9	32	17	346	7
Mid-Interior.									
Georgetown	29·87	91	64	97	6	45	19	11	1
Longreach	29·96	87	58	98	8	44	18	23	2
Mitchell	30·01	80	49	88	8	34	17	7	2
Western.									
Burketown	29·89	91	67	100	9	57	18, 20, 21	..	..
Boulia	29·96	87	60	100	1	47	23	..	..
Thargomindah	30·00	79	57	95	4	48	17	146	3

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	June. 1935.		July. 1935.		MOONRISE. June. 1935.	July. 1935.
	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					a.m.	a.m.
1	6·37	5·1	6·46	5·4	6·16	6·52
2	6·37	5·1	6·46	5·4	7·15	7·38
3	6·38	5·1	6·46	5·5	8 10	8·17
4	6·38	5·1	6·46	5·5	8·59	8·50
5	6·39	5·1	6·46	5·6	9·40	9·22
6	6·39	5·1	6·46	5·6	10·16	9·50
7	6·39	5·1	6·46	5·7	10·49	10·20
8	6·40	5·2	6·45	5·7	11·16	10·48
9	6·40	5·2	6·45	5·8	11·48	11·18
					p.m.	
10	6·40	5·2	6·45	5·8	12·17	11·53
					p.m.	
11	6·41	5·2	6·45	5·9	12·47	12·28
12	6·41	5·2	6·45	5·9	1·19	1·13
13	6·41	5·2	6·45	5·10	1·54	2·6
14	6·42	5·2	6·45	5·10	2·34	3·4
15	6·42	5·1	6·44	5·11	3·23	4·6
16	6·42	5·1	6·44	5·11	4·18	5·15
17	6·43	5·1	6·44	5·12	5·20	6·26
18	6·43	5·1	6·44	5·12	6·26	7·34
19	6·43	5·1	6·44	5·13	7·35	8·41
20	6·44	5·1	6·43	5·13	8·44	9·45
21	6·44	5·1	6·43	5·14	9·48	10·48
22	6·44	5·2	6·43	5·14	10·52	11·53
23	6·44	5·2	6·42	5·15	11·55	a.m.
24	6·44	5·2	6·42	5·15	a.m.	12·57
25	6·45	5·2	6·41	5·16	12·56	2·1
26	6·45	5·3	6·41	5·16	2·0	3·0
27	6·45	5·3	6·40	5·17	3·4	3·57
28	6·45	5·3	6·40	5·17	4·6	4.48
29	6·45	5·4	6·39	5·18	5·5	5·36
30	6·45	5·4	6·39	5·18	6·1	6·16
31			6·38	5·19		6·52

Phases of the Moon, Occultations, &c.

1 June	●	New Moon	5 52 a.m.
9 „	☾	First Quarter	3 49 p.m.
17 „	○	Full Moon	6 20 a.m.
24 „	☽	Last Quarter	12 12 p.m.

Apogee, 8th June, at 7.12 p.m.
Perigee, 21st June, at 6.6 a.m.

Venus will attain its greatest distance, 45 degrees east of the Sun on June 30, and remain above the western horizon 3 hours 28 minutes after it.

When the Sun rises on 1st July, there will be no indication that an hour or two earlier it was undergoing a partial eclipse, a third of its surface being obscured by the Moon in the neighbourhood of Spitzbergen, but only one-fourth at Edinburgh, and somewhat less at Dublin.

Mercury sets at 6.31 p.m., 1 hour 30 minutes after the Sun, on the 1st; on the 15th it sets at 5.48 p.m., 47 minutes after the Sun; Venus sets at 8.4 p.m., 3 hours 3 minutes after the Sun on the 1st; on the 15th it sets at 8.20 p.m., 3 hours 19 minutes after it; Mars rises at 1.48 p.m., and sets at 1.41 a.m., on the 1st; on the 15th it rises at 12.51 p.m., and sets at 1.12 a.m.

Jupiter rises at 3.36 p.m., and sets at 4.48 a.m. on the 1st; on the 15th it rises at 2.37 p.m., and sets at 3.46 a.m.

Saturn rises at 11.43 p.m., and sets at 12.27 a.m. on the 1st; on the 15th it rises at 10.51 p.m., and sets at 11.32 a.m.

The Southern Cross will be on the meridian, 30 degrees above the South-celestial Pole, at position XII. as on the clock-face at 8 p.m. on the 1st, and about 6 p.m. on the 30th. It will also be on the meridian 12 hours later on each of these dates when it reaches VI. in a reversed position head downwards. It will then be out of sight in Queensland, being 2 degrees below the Southern horizon at Warwick, and 13½ degrees at Cairns; when it reaches XII. it will be 58 degrees above it at Warwick, and 46½ degrees at Cairns.

Orion will be setting an hour after the Sun on the 1st, and will be entirely absent from the evening sky almost the whole of this month.

The Scorpion, being directly opposite to the Sun on the 1st, will be rising as the Sun sets.

Virgo, with its wealth of telescopic objects, will be well situated early in the evening, but will reach the meridian about 9 p.m. on the 1st, and 7 p.m. on the 30th, at 8 p.m.; on the 15th Sagittarius, the archer, will be well in view on the eastern side of the sky. The sickle-shaped part of Leo will then be half-way between north and west.

9 July	☽	First Quarter	8 28 a.m.
16 „	○	Full Moon	3 0 p.m.
23 „	☽	Last Quarter	5 42 a.m.
30 „	●	New Moon	7 32 p.m.

Apogee, 6th July, at 1.0 p.m.
Perigee, 18th July, at 12.42 p.m.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S. add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.